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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

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SUMMARY OF RECENT ABSTRACTS*

IX. LEPROSY

General

An account of the All-India Leprosy Conference of 1950 is published in *Leprosy in India* (p. 740).

CHAUSSINAND's book on leprosy is reviewed on p. 937.

RYRIE (p. 648) writes on the psychology of leprosy.

Epidemiology

Leprosy is still endemic in Memelland but is declining in most of the Baltic States. An account of the situation is given by STEINIGER (p. 43), and TELKKÄ *et al.* (p. 740) refer to the disease in Finland.

An account of leprosy in Spain has been written by CORDERO SOROA (p. 813), who makes the point that in recent surveys during which 1,879 infected persons were found, only 27 per cent. were below the age of 30. In comment Muir shows that the usual figure is between 72 and 94 per cent. Moreover, the lepromatous rate was high, 72 per cent., a usual figure elsewhere being 20–25. The low rate in children may indicate that many affected children have not been discovered, or that there is a strong tendency for the disease to die out. Control is being developed through colony-sanatoria, preventoria, mobile units, a welfare organization and education.

There are two zones of leprosy in Italy, one in the north and one in the south ; 364 cases are known, most of them autochthonous (TERNI and SIGNORINI, p. 642).

D'IGNAZIO (p. 473) writes of the distribution of leprosy in Abyssinia, and the types of disease found.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1951, v. 48. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Brief statements of results of some surveys recently made are set out in the following table :—

Author	Page	Country	Rate per 1,000	Remarks
WHEATE	161	Uganda... ...	32	No lepromatous cases : 592 persons examined.
INNES	160	Uganda (Kigesi)	6·1	19·7 per cent. lepromatous.
INNES	643	Uganda... ...	33·5	22·3 per cent. lepromatous.
INNES	563	Tanganyika ...	26·5	23 per cent. lepromatous. Moderately severe : slowly spreading.
INNES	643	N. Rhodesia ...	12·6	20·4 per cent. lepromatous.
INNES	995	Nyasaland ...	14	22 per cent. lepromatous.
POINDEXTER ...	369	Liberia	1	Estimated.
GRIMES	269	Madagascar ...	10	—
GONZALEZ PRENDES and YBARRA PEREZ	370 814	Cuba	0·41	58·23 per cent. lepromatous.
DINIZ	166	Brazil (Minas Gerais)	2·09	68·82 per cent. lepromatous.

INNES comments that in the Kigesi district of Uganda, where the Bunyon leprosy settlement was founded 30 years ago, the present low figures reflect the influence of that settlement. He shows that elsewhere in Uganda an unusual number of people have developed the disease late in life, and he makes the point that scabies, which is prevalent, may be a factor in spread. He gives information on the leprosaria in the different countries surveyed. POINDEXTER states that there are 3 leprosy villages and several treatment centres in Liberia, and GRIMES that there are 12 leprosaria and 10 segregation villages in Madagascar.

BADGER (p. 1118) gives an account of leprosy in the United States, where most of the cases seen at Carville in the past 30 years have been in foreign-born persons. Nevertheless, there are several States in which the infection is endemic, and although the general trend is downwards, there is no assurance that the disease will not spread in the future.

In Hawaii, CHUNG-HOON (p. 161) states that an average of 32 cases have been reported each year in the period 1939–49.

MALARET (p. 644) discusses leprosy in Porto Rico, and SANTOS ZETINA (p. 644) in Yucatán.

In the course of long-continued epidemiological surveys in the Philippines RODRIGUEZ (p. 644) has established the importance of contact, and especially household contact with lepromatous cases, in the spread of leprosy, and the high incidence in children. These studies have given much precise foundation for generally held impressions.

From a study of family incidence, ROMERO L. (p. 1119) concludes that familial hereditary predisposition exists.

Aetiology

MALFATTI (p. 1119) has made an electron microscope study of *Myco. leprae.*

PORTUGAL and AZULAY (p. 563) show that more leprosy bacilli are found in sections stained by the Gram method than by Ziehl-Neelsen.

SIGNORINI and TERNI (p. 44) sum up attempts which have been made in the past to cultivate the leprosy bacillus, and given an account of their own effort to cultivate it in the larva of *Galleria mellonella* (in which passage was unsuccessful). They have grown an acid-fast organism from leprous material which was not pathogenic for laboratory animals. Serological tests with different extracts of this organism gave varying results, but there was distinct specificity in the complement-fixation reaction when methylic antigen was used.

DE SOUZA-ARAUJO (p. 647) has isolated an acid-fast organism from a patient with leprosy, of which a suspension gave rise to a strong reaction on intradermal injection into the patient himself. In comment Muir remarks that this in itself is evidence that the organism was not *Myco. leprae,* which would not have caused such a violent reaction in a person harbouring large numbers of them.

TERNI and SIGNORINI (p. 266) have cultivated a slow-growing acid-fast organism from leprous material, on Petragnani and Dubos media, and GOMES and DE SOUZA (p. 370) have grown acid-fast and chromogenic organisms from rat lepromata and from human cases.

HANKS (p. 996) discusses possible improved methods of studying rat leprosy bacilli.

Tests

FELDMAN *et al.* (p. 1120) discuss the lepromin reaction and report experiments in dogs ; some of their conclusions are criticized by Muir.

WADE (p. 646) has investigated the early, 48-hour, lepromin reaction, and has found that a second injection 48 hours after the first gives a weaker reaction, probably as a result of desensitization by the first. He (p. 372) states that there is little evidence that leprosy can give rise to non-specific tuberculin reactions, though further work is desirable.

ROTBERG *et al.* (p. 266) found no correlation between the late lepromin test and the tuberculin test in healthy and tuberculous persons in the United States and Brazil, but they accept, provisionally, some degree of cross sensitization because the early, 48-hour, lepromin reaction was positive in a much higher proportion of people in Brazil than in the United States, and this is linked with the tuberculin rates. FLOCH and DESTOMBES (p. 267) agree on the existence of some para-allergy between the two organisms in persons infected with *Myco. tuberculosis,* but this is not a general rule in those infected with *Myco. leprae,* which, of course, is far less pathogenic than *Myco. tuberculosis.* In contacts it is important to convert negative to positive lepromin reactions, and this, perhaps, may be done with BCG. In an institute in São Paulo DE SOUZA CAMPOS *et al.* (pp. 372, 373) found some children positive to both tuberculin and lepromin, a larger number positive to lepromin only, and some negative to both. They think that the reactions are separate, but all the tuberculin-positive children were also lepromin-positive. In child contacts of leprosy given BCG, the lepromin test became positive within 10 months, and they think that BCG may protect against leprosy.

By observing patients and contacts who have not received sulphone treatment, and also patients who have had diasone, BASOMBRÍO *et al.* (p. 564)

have proved that the lepromin reaction can change from negative to positive, and also (which many workers have thought impossible) from positive to negative.

By using the haemagglutination test with leprosy sera, LEVINE (p. 646) concludes that *Myco. tuberculosis* and *Myco. leprae* possess common antigens.

SHIVELY and KUHNS (p. 162) discuss cardiolipin antigen in tests for syphilis in leprosy, concluding that the cardiolipin complement-fixation test is the most specific.

A distinctive pattern in the universal serological reaction has been observed in lepromatous leprosy, and may be a guide to treatment. KAHN (p. 997), however, has not found a distinctive pattern in tuberculoid and non-characteristic leprosy. PINTO and ZEO (p. 1121) found this pattern only in a proportion of cases ; in some it became apparent after treatment with promin.

The serial cephalin flocculation test shows certain patterns in different forms of leprosy, and ROSS (p. 997) shows that the repeated use of this test may be useful as a guide to treatment and prognosis.

Clinical findings

SYMMERS (p. 999) describes a man who developed leprosy at the age of 84, after being given stilboestrol for 13 months on account of prostatic trouble.

The Lucio form is reported by ARNOLD and SLOAN (p. 998) ; tests for syphilis were positive and the pustular blebs yielded to neoarsphenamine. In another case FLOCH and DESTOMBES (p. 645) think that it was in reality a reacting tuberculoid.

GOMEZ ORBANEJA and PUCHOL (p. 998) describe a case which fluctuated between the lepromatous and tuberculoid forms.

ARGÜELLO PITT and ALBERTO CONSIGLI (p. 815) describe the lesions first seen in 67 diagnosed cases among 596 contacts examined. In 80 per cent. there were changes in sensation, and most had initial macules 2–3 cm. in diameter, usually on thighs, arms or buttocks. In 80 per cent. bacteriological examination was negative. ALANDAROV (p. 645) discusses the early changes in apparently intact skin in various forms of leprosy.

A description of the eye lesions of leprosy, and a discussion of the importance of examination of the eyes are given by ELLIOTT (p. 1122) in an important paper which should be read in the original. He (p. 75) describes leprous nodules or polyps which he has observed on the retina in 6 cases, 4 of which were lepromatous, one mixed and one tuberculoid. TOMÁS APARISI (p. 816) comments on the frequency of keratitis (32–60 per cent.) in patients at Fontilles. He thinks that the eye in general is probably often infected by the blood stream.

The osseous changes in neural leprosy are described by BARNETSON (p. 161), who illustrates his paper with 33 excellent radiographs. He (p. 162) correlates these appearances with findings in feet removed at autopsy, or amputated.

In a paper on visceral leprosy SANDALIO MIGUEL (p. 815) ascribes the anaemia so often found to infection of the bone marrow, and gastro-intestinal disorders to infection of the liver. Hypotension and asthenia may be due to infiltration of the suprarenals with amyloid material. CAMPOS and MOLINA (p. 371) have examined liver biopsy material in 5 cases of tuberculoid leprosy and 2 of undifferentiated leprosy, and have found tuberculoid follicles in 6, thus proving that the infection in these forms is not confined to skin, nerves and superficial lymph glands.

Renal lesions are often found at autopsy in leprosy patients, and observations made during lepra reactions by ROMERO *et al.* (p. 1123) indicate that toxins liberated from the bacilli at those times cause parenchymatous lesions of the kidneys.

AUSTIN (p. 369) reports on leprosy in the Makogai hospital, Fiji, noting that the chief causes of death are leprosy itself, tuberculosis and renal disease. He has used sulphetrone extensively, with success, but has found that it possesses marked toxicity.

PARAS (p. 645) has studied the deficiency of calcium which is a feature of the sera of leprosy patients, and which he claims is a deficiency of calcium bound to the proteins. UYGUANCO *et al.* (p. 997) found in leprosy patients a considerable reduction in the albumin-globulin ratio, which was parallel with a reduction in haemoglobin.

CROXATTO and CHIRIBOGA (p. 996) discuss inclusion bodies in the giant cells of leprosy.

The histological structure of the leproma is described by BUCCO (p. 161).

CAMPOS (p. 266) has studied lipoids in the leprous tissues. They are commonly visible in lepromata and in reacting tuberculoid lesions, and the droplets are found only in monocytes which do not have the ability to destroy the leprosy bacilli ingested by them.

Treatment

General.—GRAMBERG (p. 817) discusses the non-specific treatment of leprosy —without mention of the sulphones which, as Muir comments, would render unnecessary much of the local treatment he describes.

BROTTO (p. 47) has used, with some success, in the obstinate segmental neuralgia (ulnar and sciatic) of leprosy, a treatment by injection of the roots or trunks of the nerves with 6 ml. of 0·75 per cent. solution of ammonium sulphate and 4 ml. of 2 per cent. procaine, mixed immediately before injection and repeated every 5 days for 4–5 injections.

In a long monograph, which should be read in detail, DE SOUZA-ARAUJO (p. 46) describes the selected combination of methods of treatment which he uses in patients with leprosy of different types. In the original paper he gives minute details of 20 cases in illustration of his methods, which include chemotherapy, surgical treatment, electrical treatment and cauterization. Chaulmoogra finds a place, in addition to the sulphones.

Chaulmoogra.—MUIR (pp. 165, 1127) explains that clinical appearances in lepromatous leprosy can be misleading, and the true criterion is the bacillary index. He has combined oral sulphones with intradermal hydnocarpus oil, with success. DHARMENDRA (p. 163) retains the use of this oil in certain conditions. TOLENTINO (p. 163) agrees that chaulmoogra cannot be ignored, and obtains the best bacteriological results with a combination of it with the sulphones. LAVIRON *et al.* (pp. 648, 741, 1124) have used DDS suspended in the ethyl esters of chaulmoogra, injected intramuscularly every 15 days, with results equal to those of daily oral DDS. LAVIRON and LAURET (p. 1123) also report favourably on large doses, 5 cc. thrice each week, of intravenous chaulmoogra, suitably prepared.

Sulphones.—Most of the papers on treatment deal with DDS, which received much attention and some criticism. Therapeutically it seems to be effective in doses of 100 mgm. or even 50 mgm. daily, by mouth (MUIR, pp. 375, 1127). In Nigeria LOWE (pp. 374, 1000) has given up to 200 mgm. daily or 400–500 mgm. twice each week, and has found that toxic effects are similar to those with other sulphones. He mentions dermatitis and psychosis, the latter in patients who had received higher doses than these, or who were already mentally unstable. He (p. 649) found DDS excellent in tuberculoid leprosy— the first stage is usually one of increased reaction, followed by subsidence, desquamation and gradual improvement. LOWE and DAVEY (p. 1124) report to the same effect, and they show that the complex sulphones are hydrolysed

to DDS in the stomach, and that DDS is not excreted unchanged in the urine, but mainly in the form of a water-soluble metabolite. In lepromatous leprosy MUIR (p. 1127) found with DDS improvement to the extent of 21–48 per cent. according to severity of the lepra reaction or the stage at which treatment was started. Administration of vitamin B_{12} is useful for patients intolerant of DDS, but iron is not necessary.

FRANCIS and SPINKS (p. 268), FLOCH and RIST (p. 375) and LANGUILLON (p. 1127) also write favourably of DDS.

SCHNEIDER and RAYROUX (p. 268) have given DDS in a single dose, every 2 weeks, of 1·25 gm. suspended in 5 cc. of ethyl chaulmoograte, which allows a constant blood level for some time, but FLOCH *et al.* (p. 742) prefer a saline suspension for injection, since blood concentrations with chaulmoogra or arachis oil are very irregular. They do not think that the chaulmoogra adds to the value of injection treatment. FÉRON (p. 269) thinks that intraspinal injections may be useful in anaesthetic leprosy, and suggests that DDS should be tried.

DHARMENDRA *et al.* (p. 564) have studied the pharmacological action of DDS, its absorption and excretion. For maintenance of blood levels two divided doses each day are better than a single dose.

The toxicity of DDS has been the subject of comment by certain authors. COCHRANE (p. 565) thinks that the dosages used by LOWE in Nigeria are too high for India, and advocates 600 mgm. each week, reached gradually and given in two doses of 300 mgm. He recommends, however, injection of 50 per cent. aqueous solution of sulphetrone as being less toxic. In another paper he writes to the same effect, but adds that though sulphones are indicated in all lepromatous cases, where cost is important hydnocarpus may be tried first, and sulphones reserved for cases which do not respond. Higher dosage of DDS up to 300 mgm. daily, has been followed by haemolytic anaemia (RAMANUJAM and SMITH, p. 374) and toxic hepatitis (JELLIFFE, p. 898), and ALLDAY and BARNES (p. 1126) in Nigeria report alarming toxic reactions on a daily dosage of 200 mgm. DDS, showing as a papular or exfoliative rash with fever, enlargement of the liver and jaundice, swelling of the lymphatic glands and mononucleosis. This may improve, or it may go on to a fatal ending. They reduced the routine dose to 100 mgm. daily, but even with this one case occurred with these signs. In comment Muir points out that these reactions have been reported only from Nigeria [but see MEREDITH and PATTON below], and thinks that the DDS may have activated some latent infection. However, it is known that 200 mgm. daily is now considered a dangerous dose in advanced lepromatous cases.

In Northern Rhodesia MEREDITH and PATTON (p. 1125) report febrile exacerbations of lesions, as exfoliative dermatitis, or oedema and joint pains, in patients taking DDS. These disappeared when the dose was reduced to 100 mgm. daily, and this was found to be therapeutically effective. The patients were taking a poor diet, but were given an iron preparation as a routine.

FLOCH and DESTOMBES (p. 648) find that oral DDS leads much more often than injected DDS to the lepra reaction. In comment Muir points out that there is a much higher temporary blood concentration after oral administration. The same authors (p. 375) think that monosubstituted sulphones such as succinyl-DDS (1,500 F) are more active than disubstituted compounds such as sulphetrone, and are less toxic than DDS. Succinyl-DDS can be given orally, intramuscularly or intravenously ; it is better tolerated by injection than by mouth. They report favourably on 55 patients treated with it. They (p. 1000) show that in mice a combination of DDS and succinyl-DDS is less toxic than either alone. Clinically, the two seem to act synergically.

Floch *et al.* (p. 999) show that succinyl-DDS is excreted unchanged to the extent of 90 per cent. in the urine.

Reports on other sulphones still indicate their value (Rio Leon, p. 814). Rath de Souza and de Souza Lima (p. 45) incline to the view that they act on the lepra cell rather than on *Myco. leprae* itself.

The Carville experience has been recorded by Ross (p. 376), who discusses the absorption and excretion of these drugs. Johansen and Erickson (p. 474) sum up this work, noting that relapses have occurred in some of the patients followed for 1–5 years. It seems advisable to continue treatment, with small doses, after apparent recovery (Erickson, p. 166). Mention should be made of the book "Miracle at Carville" by Betty Martin (p. 601), an effective story of the dramatic effect of the sulphones on patients in poor condition.

The average duration of sulphone treatment in 19 lepromatous patients who were discharged from a leprosarium is given by Wattley (p. 165) as 41 months, varying from 29 to 53.

In lepromin tests in 78 lepromatous patients treated with sulphones, Dharmendra and Mukerjee (p. 165) found only 1 in whom the reaction could be regarded as positive.

Pennec (p. 165) injects promin intradermally into the cutaneous lepromatous lesions. Rodriguez (p. 649) sums up long-term results with promin in the Philippines, where improvement occurred in 81 per cent. But the bacteriological results were not so good, and no patient became bacteriologically negative. Diasone gave similar results. Writing of diasone in lepromatous leprosy Martínez Domínguez (p. 816) reports bacteriological improvement in 78·8 per cent. including 49·3 per cent. who became bacteriologically negative after 6 months. Muir comments that this is a most unusual finding. In Martinique Montestruc and Blaché (p. 1127) report favourably on the sulphones (chiefly diasone) and Hueck (p. 741) also reports on diasone.

Feron (p. 649) reports clinical improvement with sulphetrone in lepromatous disease, and in missions in Uganda Connolly (p. 1125) and Wheate (p. 1125) have experienced good results with this drug. Sulphetrone is effective by intramuscular injection and Dharmendra (p. 164) quotes doses of 4–5 gm. each week, against 36 gm. needed by mouth. In later papers Dharmendra *et al.* (pp. 164, 374) show that parenteral administration of sulphones causes less anaemia than oral administration, and that with sulphetrone the effective intramuscular dose is only one-fifth of the oral dose. They advocate an aqueous solution or a hydnocarpus emulsion, and the dose should be 1 gm. injected daily, or 1·5 on alternate days, or 2 gm. twice each week.

Other drugs.—Lowe (p. 649, 1000) indicates that streptomycin promises to be very useful in leprosy, in which it tends to provoke definite reactions, and Lowe and Davey (p. 1124) refer especially to its value in tuberculoid disease. Johansen and Erickson (p. 474) write to the same effect about streptomycin, and Erickson (p. 1001) gave it in an extensive trial and obtained good results, but the difficulty is that it cannot be continued indefinitely because of the toxic manifestations. It is useful in combination with sulphones, in iridocyclitis, and in patients sensitive to sulphones. Apparently good results were found by Garduño and de Leon (p. 1128) in a patient with leprosy and tuberculosis after treatment with streptomycin. The lesions were bacteriologically positive at first but became negative later.

Considerable clinical improvement under treatment with thiosemicarbazone is reported by Vegas *et al.* (p. 651), Lowe and Davey (p. 1124), Johansen and Erickson (p. 474), and Schneider and his colleagues (pp. 650, 651), but Jacono and Colucci (p. 166) obtained only modest results in two patients.

Preliminary work on the treatment of 3 leprosy patients with PAS is reported by Bolgert *et al.* (p. 45).

Chloramphenicol was not found useful by PARDO-CASTELLO *et al.* (p. 652).

HASHIMOTO *et al.* (p. 566) have used cepharanthin in leprosy, orally and intravenously, and have apparently secured some remarkably good results. This drug had previously been used in tuberculosis.

Some indication of good results with sarsaparilla is given by ROLLIER *et al.* (p. 1128).

KIKUTH and MUDROW-REICHENOW (p. 271) found that the diamidines had little effect in rat leprosy.

For the lepra reaction FLOCH and DESTOMBES (p. 648) do not use antihistamines or antimony, but give vitamin D_2. In a discussion of a paper by ERICKSON (p. 1123) ROCHE reports remarkable results with ACTH.

Control

DOULL (p. 1129) discusses the large issues in the control of leprosy, noting the particular importance of lepromatous disease in household infection. He thinks that properly organized campaigns of chemotherapy might tip the present critical biological balance in favour of man and against the bacillus. Special attention should be paid to open cases and households with higher prevalence.

TOLENTINO (p. 742) shows that the leprosy position in the Philippines has not improved with comparatively strict segregation laws, and suggests that these should be relaxed, and that treatment at leprosaria should be voluntary.

DE MELO (p. 607) notes that persons in Goa with leprosy tend to be thrust out by their families, and exist in squalor on charity. A leprosarium has been established.

MONTESTRUC and BLACHÉ (p. 270) quote 7 children of leprous mothers, who were given BCG at birth and usually again later, who are free from leprosy after 5–12 years, though living in close contact. They contrast these with 4 others not given BCG, all of whom became leprous within 7 years. USTVEDT (p. 1120) in a small experiment in Norway found that after vaccination with BCG there was a tendency for those who became positive to the adrenaline-Pirquet tuberculin test to become positive to lepromin, but this was not the case with those positive to the Mantoux test but negative to the adrenaline-Pirquet. ROSEMBERG *et al.* (p. 1121) found that 38 healthy children of leprous parents, isolated at birth, who were given BCG, all became positive to the lepromin test. They regard the positive lepromin test as an indication of resistance, and suggest that BCG should be widely used in leprosy control.

Rat leprosy

HANKS and BACKERMAN (p. 270) note the tissue sites of rats and mice most suitable for the development of murine leprosy bacilli.

NOËL and MARIE-SUZANNE (p. 652) report a histological study of lesions in wild rats after injection of *Myco. leprae.* *Charles Wilcocks*

MALARIA

RUSSELL, P. F. **Italy in the History of Malaria.** *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 93–104. [18 refs.]

"No country has contributed more to malariology than has Italy." In nine pages the author has traced the history of malaria from the earliest observations to the time of writing with special reference to the part played by Italian scientists. In a period of 70 years Italy has contributed steadily to the literature from the earliest observations on the parasite in the asexual and sexual cycles to the introduction of DDT as a residual insecticide, and finally the eradication of the disease. *R. Ford Tredre*

Havlík, O. & Rosický, B. Malarie na Moravě po druhé světové válce. [**Malaria in Moravia after the Second World War**] *Časopis Lékařů Českých.* Prague. 1952, July 25, v. 91, No. 30, 888–93, 1 fig. [11 refs.] English summary.

See this *Bulletin*, 1948, v. 45, 480.

Huang, Shu-yun. **A Preliminary Survey of Malaria among the National Minorities in Pai-Sha Hsien, Hainan Island.** *Chinese Med. J.* Peking. 1952, Jan.–Feb., v. 70, Nos. 1/2, 67–74. [21 refs.]

This is a report of a short malaria survey carried out by a Health Unit sent to Hainan Island by the Health Department of Kwangtung Province in the summer of 1951.

Pai-Sha Hsien has four administrative sections. In the first there are 130 villages with 16,811 Lis and Miaos. Fifteen Li villages and one Miao village, all within 3 miles of the Hsien government headquarters, were selected for study. The average spleen index of children aged 1 to 12 in the 16 villages was 89·9. The average spleen index of adults was 32·6.

The blood of 552 persons was examined : parasites were found in 144, 26·1 per cent. The parasite index of children was 39, of adults 5·5. Only thin blood smears were examined. The species of parasite found were *P. vivax* 59 per cent., *P. falciparum* 40·3 per cent. and *P. malariae* 0·7 per cent.

Mosquitoes collected from human dwellings numbered 356, of which *A. minimus* made up 92·7 per cent. and *A. aitkeni* 2·8 per cent. There were 16 culicines including a single specimen of *Aëdes aegypti*. Irrigation ditches with much marginal vegetation are ideal breeding places for *A. minimus*. Seventy-four *A. minimus* were dissected : 8 were infected, 3 with sporozoites, an infection rate of 10·8 per cent.

In order to compare these conditions with those prevailing among the Han-Chinese population, the town of Nodoa Chin, 40 miles distant from these villages, was briefly surveyed Here the spleen index of 302 children was only 11 per cent. and the parasite index 1 per cent. Malaria is not a serious problem in Nodoa Chin. *Norman White*

de Carvalho, F. F. & Rachou, R. G. Considerações sôbre a malária no Estado do Rio de Janeiro, com especial referência ao Vale do Rio Piraí. [**Malaria in the State of Rio de Janeiro, with special reference to the Pirai Valley**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1951, July, v. 3, No. 3, 473–87. [13 refs.]

The English summary appended to the paper is as follows :—

" The authors present some general considerations about malaria incidence in the State of Rio de Janerio, specially in the Pirai Valley where a private company is working on a dam construction. The State of Rio de Janeiro is divided in 56 counties ; in 33 of these malaria had been found. Until 1949 27 species of anophelines have been registered in the State. The malaria vectors are *A. darlingi*, *A. tarsimaculatus* and *A. albitarsis*.

" The authors present also some results of the DDT (inside houses) campaign of the Serviço Nacional de Malaria, covering all malarigenous area of the State and started in 1947. The number of cases of malaria dropped from 33,809 in 1945, 21,932 in 1946 and 22,063 in 1947 to 2,715 in 1948, 687 in 1949 and 245 in 1950 (the first six months of this last year)."

BRUYNING, C. F. A. **Some Observations on the Distribution of *A. darlingi* Root in the Savannah Region of Surinam.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, June, v. 4, No. 2, 171–4, 1 map.

Surinam (Dutch Guiana) may be divided into 4 zones ; in the north the marshy coastal region ; then south of this the sandy savannah belt ; next the hilly forest, and lastly the savannah and swamp region of the south.

In and around Matta, a village in the sandy savannah, the following anophelines were observed at various times and places between March and August 1951 : *A. mediopunctatus, A. peryassui, A. shannoni, A. darlingi, A. nimbus* and *A. oswaldoi.*

The permanent breeding places of *A. darlingi* are along the large rivers south of the savannah belt. This belt normally forms a natural barrier preventing *A. darlingi* from spreading north ; but in the rainy season this mosquito is able to penetrate north, east and west into the savannah along the broader rivers. This it can do fairly easily, which may account for the higher spleen rates along them ; but it does not spread easily along the narrow creeks, which in turn may explain the lower spleen indices in Matta. The low spleen indices in villages along the Para river may be explained in the same way.

In years with heavy prolonged rainfall this extension of breeding places will be even greater, and the severe epidemics which have occurred at some villages might be due to such short-lived extensions of the breeding area of *A. darlingi.* The construction of canals and reservoirs might also encourage such invasions. *H. S. Leeson*

i. VISWANATHAN, D. K. **A Review of Immunity in the Vertebrate Host against Malaria.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 271–85. [68 refs.]

ii. ——. **A Review of Immunity and Endemicity in Malaria and a Discussion on their Relationship with Malaria Control.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 251–69, 2 figs. [27 refs.]

These two discursive papers are to a large extent complementary to each other, although there is some overlapping.

i. The first above is a fairly comprehensive review of previous work and observations on different aspects of immunity in man and other vertebrates against malarial parasites. This includes innate and acquired immunity, humoral and cellular mechanisms, and a brief survey of the histopathology of the disease. The author differentiates between antiparasitic immunity and antitoxic immunity, although the existence of the latter is still largely hypothetical and some authorities consider that any apparent antitoxic reactions are the consequence of antiparasitic effects lowering the metabolism of the parasite. He considers that in ancient communities which have long resided in areas where malaria is " superendemic " there is a process of natural selection of those individuals most resistant to the toxic effects of the parasite. One manifestation of this is that infants inherit a considerable degree of humoral antitoxic immunity, which is active against toxic effects but not against parasite multiplication. This antitoxic immunity also tends to delay the development of acquired antiparasitic immunity because by raising the pyrogenic threshold and mitigating the cellular reactions it reduces the contact of parasite antigen with the defensive tissues. This factor, as well as a high inoculation rate, accounts for the high parasite densities found in infants and young children in the absence of any gross splenomegaly or of any obvious morbidity. Antiparasitic immunity is acquired later in life and causes the typical fall in parasite densities with increasing age. This condition is found in India only among the primitive

hill tribes ; with all other peoples such inherited humoral immunity as there may be is insufficient to prevent infant morbidity and mortality.

ii. This hypothesis is illustrated in the second paper above by the author's observations of two groups of tribes living in the Jeypore and Gudem Agency Hill tracts of Madras and Orissa. Transmission, due to *Anopheles fluviatilis*, is perennial and the two groups suffered the same inoculation rate. In the first group (the aboriginal Gadabas, Porjas, Khonds) there are high parasite and spleen rates in early childhood with high parasite densities, but a comparatively small average enlarged spleen and little evidence of morbidity. All indices fall to low figures in adult life, the spleen rate always remaining below the parasite rate. In the second group (the more recently arrived Dhombs and Malas) parasite densities in childhood are lower, but there is a larger average spleen ; parasite and spleen rates do not fall so low in adult life, and there is evidence of morbidity at all ages.

In a later section, however, there is an analysis of infant parasite rates by monthly age-groups, with figures obtained in Upper Assam, where transmission is by *Anopheles minimus* and is perennial though showing some seasonal variation. The formulae of MACDONALD [this *Bulletin*, 1950, v. 47, 907] are applied to data collected at the height of the season and to cumulative data for the whole year in order to work out the theoretical inoculation rate and upper limit of the parasite rate. By comparing the figures so calculated with the figures obtained from field studies the author considers that he is justified in using the cumulative data for parasite rates by monthly age-groups as representative of the true picture. The curve fitted to these rates suggests that in infants below 2 months old there is a transient *antiparasitic* immunity [reviewer's italics]. This is thought to be inherited and humoral, and to occur only in certain places where transmission is more or less perennial and where the inoculation rate exceeds certain limits ; but it can be broken down by high inoculation rates at the peak of the season. This presumably accounts for the fact that a curve fitted to parasite rates obtained during the main season shows no evidence of any inherited immunity. [These observations are not inconsistent with those first discussed, but the evidence for them seems to be less suggestive, especially as in the analysis of a third set of infant parasite rates the author cautions against the use of cumulative data where there is seasonal variation.]

Using as a basis the recommendations of the WHO conference on malaria in Africa, 1950 [this *Bulletin*, 1951, v. 48, 697], the author suggests the following modified classification of malarial endemicity to cover conditions found in India :—

1. Hypoendemic—child (2–10) spleen rate below 10 per cent.
2. Mesoendemic—10–24 per cent. ; low inoculation rate, and transmission season usually less than 3 months.
3. Highly endemic—25–49 per cent. ; higher inoculation rate than 2 and perhaps equal to that of 4, but transmission season less than 6 months.
4. Hyperendemic—50–74 per cent. ; transmission for 6 to 9 months.
5. Holoendemic—75 per cent. and over, associated with high adult spleen rate ; high inoculation rate may be the same as 3 or 4, but transmission lasts 9 months or longer.
6. Superendemic—75 per cent. and over with low adult spleen rate and sickness. This distinguishes the small number of communities discussed above who have developed " tolerance " to the effects of parasitic invasion.

Epidemics may occur in groups 1 and 2.

[This classification of degrees of endemicity covers the risk of inoculation and its period of operation, and the reactions of different communities. Further

epidemiological studies will doubtless open the way for still more subdivisions. To avoid confusion it would seem better if in future the incidence of malaria and its effects could be defined in precise terms of the actual conditions found.]

In discussing the economic importance of malaria and the results of large-scale control measures with DDT residual spraying, the author quotes the dramatic changes in vital statistics in Kanara District, Bombay State. These results have been previously reviewed [this *Bulletin*, 1951, v. 48, 127, 305]. Some authorities consider that the inception of control measures in heavily infected areas may lead to an increase in adult sickness and mortality in those who suffer from " residual " malaria, because of the withdrawal of premunition. From experience, and for various reasons given, the author does not consider this a serious danger, nor does he consider that the suspension of control measures in a previously " hyperendemic " area would lead to a sudden fulminant epidemic, but that obvious premonitory signs would be given of the return of malaria. *C. C. Draper*

Tokura, N. **A Contribution to Pathogenesis of Malaria and a Suggestion for Immunogenesis from Malaria.** *Yokohama Med. Bull.* 1951, Oct., v. 2, No. 5, 279–85, 18 figs. on 2 pls.

The author attempts to develop a general theory regarding immunity in malaria from experiments on canaries infected with *Plasmodium elongatum* and *P. cathemerium*. *P. elongatum* invaded only a low percentage of erythrocytes, but " E-forms " were common in the organs, anaemia was profound and the mortality rate was 97·5 per cent. *P. cathemerium* on the other hand was essentially a parasite of the erythrocytes, " E-forms " were rarely found, anaemia was slight and mortality was only 40 per cent. By giving liver extract to birds lightly infected with the former species, the author was able to prolong their lives by weeks or months.

It is then stated that " E-forms " of malaria are responsible for " immunogenesis " and that " organisms " lucky enough to survive infection primarily exo-erythrocytic acquire a strong immunity and do not have relapses, while " organisms " with essentially erythrocytic infections suffer less but have little immunity and many relapses. The author continues that " we can perhaps safely acknowledge that the number of E-forms is great in the *Tropica* parasite and small in the *Tertiana* parasite " and suggests that after a " fierce struggle with the E-forms " of the former (*i.e.*, *P. falciparum*) immunity speedily develops, while with the latter (*P. vivax*) there are few E-forms, little immunity and many relapses.

[The evidence provided by mammalian malaria does not confirm this theory : there is no " fierce struggle ", " E-forms " are as numerous in *P. vivax* as in *P. falciparum* and immunity is probably greater in *vivax* malaria than in *falciparum*.] *P. C. C. Garnham*

Aquilina, J. T. & Paparella, J. A. **Malaria in Returned Veterans of the Korean War. Clinical Observations.** *J. Amer. Med. Ass.* 1952, June 28, v. 149, No. 9, 834–8, 2 figs.

Fifteen soldiers from Korea who had been receiving anti-malarial suppressive therapy while on service were treated at the Veterans Administration Hospital, Buffalo. All proved to be infected with *Plasmodium vivax*.

The onset of malaria after the last suppressive dose varied greatly, from 10 to 294 days. Splenomegaly occurred in 8 and all except one had some degree of anaemia and leucopenia. Chloroquine diphosphate was given in

treatment—1 gm. being exhibited immediately, 0·5 gm. within 6 hours and 0·5 gm. daily for 3–5 days.

The advantages of this drug are obvious ; it is easy to administer, does not cause toxic symptoms, causes prompt defervescence and rapidly destroys parasites in the blood stream.

Full details of all 15 patients are given in a table. *Philip Manson-Bahr*

Schmidt, L. H., Loo, T. L., Fradkin, R. & Hughes, Hettie B. **Antimalarial Activities of Triazine Metabolites of Chlorguanide and Dichlorguanide.** *Proc. Soc. Exper. Biol. & Med.* 1952, June, v. 80, No. 2, 367–70. [13 refs.]

From experimental investigation it appeared that proguanil (chlorguanide) was converted to a more active metabolite in the animal body [this *Bulletin*, 1947, v. 44, 648 ; 1949, v. 46, 334]. Carrington *et al.* (*Nature*, 1951, Dec. 22, 1080) isolated a substance from human urine and rabbit faeces after treatment with chlorguanide which was 10 times as active as the parent substance against *P. gallinaceum* infections of chicks and was assigned the constitutional formula 2 : 4-diamino-1-*p*-chlorophenyl-1 : 6-dihydro-6 : 6 dimethyl-1 : 3 : 5-triazine(A). A second substance believed to be 2 : 4-diamino-1-(3 : 4-dichlorophenyl)-1 : 6 dihydro-6 : 6-dimethyl-1 : 3 : 5 triazine(B) was also isolated as a metabolite of dichlorguanide, and proved to be 50 times more active than the parent compound against the same avian infection. Metabolic studies by the present authors on the fate of chlorguanide and related substances in man and monkeys had failed to establish the formation of metabolites more active than the parent substances as judged by the effect on *P. cynomolgi* infections. A study of the metabolic activities of the synthetic substances A and B in *P. cynomolgi* infections of monkeys was therefore undertaken to see if the divergent results in the avian and simian infections could be reconciled. In all cases the drugs were administered once daily on 7 consecutive days at different dose levels, and the effect on parasitaemia was followed in stained films ; 18 monkeys were used in comparing the activities of chlorguanide and substance A, and 20 monkeys in comparing dichlorguanide and substance B. It was found that in the monkey infection chlorguanide was 2 to 4 times as active as substance A and had approximately the same activity as substance B. The metabolites A and B thus show reduced activity in the monkey infection compared with that in the fowl. These contrasting activities in the two infections may be explained by difference in susceptibility of the two parasites or in the way in which the respective hosts dispose of the drugs. From the available data it is not at all certain that the triazines A and B will prove of value in the treatment of human malaria. *J. D. Fulton*

Gilroy, A. B. **An Investigation of Proguanil Prophylaxis and Co-Existing Parasitaemia.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 72–84. [10 refs.]

This investigation was made on 11 widely separated tea-plantations in Assam where it had been noted that malaria parasites were present in the blood of some patients supposed to be receiving prophylactic doses of proguanil in two 100 mgm. doses each week or a single dose of 300 mgm. in the same period. Blood films were made and samples of urine collected from 742 adults between 12 and 36 hours after administration of the drug. The presence of the latter in the urine was detected by the method of Gage and Rose [this

Bulletin, 1947, v. 44, 500] which depends on the colour formed between the copper complex of proguanil and sodium diethyldithiocarbamate. It was found that 56 per cent. of the urines indicated the presence of drug. In 37 per cent. of those in which the urine was positive and in 44 per cent. of those in which the test was negative, malaria parasites were present in the blood. There was no significant correlation in the occurrence of parasites in the blood and the presence or absence of the drug in the urine. Parasitaemia in those taking proguanil appeared to depend to some extent on the spacing of doses and the amount of exposure to infection. The parasite rate in persons taking prophylactic doses of 100 mgm. proguanil twice weekly and with positive urines was lower than in those in whom the test for drug was negative. In others taking 300 mgm. once per week no such difference was apparent. No evidence was obtained of the presence of drug-resistant strains of the parasite.

J. D. Fulton

HACKETT, L. W. **The Disappearance of Malaria in Europe and the United States.** *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 43–56, 3 figs.

The author describes the steps of the natural disappearance of malaria from some regions of North Europe and of the United States of America, and discusses the causes of this disappearance. He considers the various malaria control measures used in the North of both Continents and concludes that in those territories malaria would have disappeared spontaneously ; however, money spent in the United States in the last decade to accelerate its departure has been justified by the results. *R. Ford Tredre*

DOWLING, M. A. C. **The Malaria Eradication Scheme in Mauritius.** *Brit. Med. J.* 1952, Aug. 9, 309–12, 1 graph.

——. **Malaria Control in Mauritius.** [Correspondence.] *Ibid.*, 339.

This paper is a repetition of previous publications [DOWLING, this *Bulletin*, 1951, v. 48, 327 ; 1952, v. 49, 234, 367 ; also RANKINE, *ibid.*, 1952, v. 49, 366]. The features of this campaign have been the success of DDT as a residual insecticide in eliminating *Anopheles funestus*, and at the same time an apparent lack of success with insecticides against *A. gambiae*. Consequently in the relatively dry winter season the method of attack was changed to the application of larvicide (Shell Malariol High Spread) to the permanent breeding waters of *A. gambiae* along the coast. In his letter the author reports that initial results in the dry season of 1951 were satisfactory but an unusually heavy rainfall in the ensuing February 1952 caused an increase in breeding of *A. gambiae* despite efforts to control it. Coincidentally a study of the incidence of malaria showed that transmission of the disease had virtually ceased throughout the island during the first seven months of 1952. Having evidently achieved the objective it seemed economically unsound to continue and extend a large-scale anti-larval campaign aiming at eradication of the vector mosquito which had ceased to transmit. It is proposed therefore to follow up any positive cases which occur and use residual insecticides in houses selectively. Continued absence of malaria will depend on the vigilance of an efficient staff. The total annual cost of the campaign has been a little more than 3 shillings per head of the population, and the annual maintenance cost of the measures now advised is estimated at 9 pence per head. *R. Ford Tredre*

SAUTET, J. Le Paludisme et la lutte antipaludique en Guadeloupe. Rapport sur l'activité du service antipaludique en 1951. [**Report on the Activity of the Guadeloupe Anti-Malaria Service in 1951**] 46 pp., 3 figs. (1 folding) & 3 maps (1 folding). [32 refs.] 1952. Basse-Terre : Direction Départementale de la Santé.

In 1951 DDT spraying of houses on a considerable scale was first undertaken in Guadeloupe. In this report the malaria conditions prevailing in the Island at the beginning of the campaign are described. The disease prevailed with varying intensity in different parts of the Island : some places had spleen indices varying from 25 to 36 ; in others, indices as low as 2 to 8 per cent. were recorded. Similar variations in parasite rates from 0 to 50 per cent. were reported.

Malaria transmission takes place throughout the year but the endemic assumes larger proportions from mid-September to mid-March, which includes the rainy season, than in the remaining 6 months of the year, which are relatively dry. *Plasmodium falciparum* is the prevalent parasite : *P. malariae* infections are much less frequent. No *P. vivax* infections have been noted in recent years. The disappearance of *P. vivax* is a recent development : a report on malaria in Guadeloupe written in 1940 stated that some 75 per cent. of all infections were *P. vivax*.

Three species of *Anopheles* are found in Guadeloupe : *A. aquasalis*, *A. albimanus* and *A. argyritarsis*. *A. aquasalis* is the most important vector and with *A. albimanus* is responsible for nearly all the malaria in the Island.

The residual spray used was a 5 per cent. solution of DDT in kerosene. During the year 12,563 houses were treated ; they sheltered a population of 46,998. In the worst infected places a similar solution of DDT was used as a larvicide. In all communes in which the spleen index was over 10 the school children received anti-malarial medication.

It is too early to dogmatize about the results achieved. They are sufficiently encouraging to warrant the adoption of the extended programme that was drawn up for 1952. *Norman White*

GABALDON, A. **The Effect of DDT on the Population of Anopheline Vectors in Venezuela.** *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 29–41.

The proved vectors of malaria in Venezuela are *Anopheles* (N.) *albimanus* and *Anopheles* (N.) *darlingi* ; epidemiological evidence suggests that others may be involved in certain localities. Since 1946 DDT has been in routine use as a residual insecticide ; as a result there has been a marked decrease in malaria morbidity, as measured by microscopical examination of blood films, verging on total elimination. Routine mosquito surveys associated with this programme have shown that adult captures in selected catching stations are not a true picture of species populations. Larval surveys by standardized methods do give a reliable indication of fluctuations in species population due to natural circumstances and the use of residual insecticides. Data are collated and finally indices of infestation and density are established. There are, respectively, the times a species is found per 100 units and the number of larvae collected per 100 units ; a unit is a standard visit to a breeding place. Variations in density of 15 species of anophelines in 5 selected towns for the pre-DDT period 1941–5 are obvious in the tabulated data when this method of larval indices is used, and form the basis for assessing the effect of DDT on species populations.

The number of animals compared to men in a locality breeding *A. albimanus* influences the degree of reduction in numbers of this malaria vector, but the

reduction of *A. darlingi* is not so affected and eradication of this species can be attained, provided that its population is not on the ascending limb of its very marked non-annual cycle of fluctuation. The control of malaria through interruption of transmission occurs by :—

(*a*) Eradication of *A. darlingi* ;

(*b*) Reduction in numbers of either *A. darlingi* or *A. albimanus* ; and

(*c*) Interception of the vector, as in the instance of the persistence of *A. albimanus* due to alternative animal feeding.

Tabulated data illustrate these conclusions. *R. Ford Tredre*

Corrigendum

In the abstract of the paper by Telcharov and Todorowa [this *Bulletin*, 1951, v. 48, 517] the wording in the next to the last paragraph may be interpreted as stating that these authors found exo-erythrocytic schizonts in monkey and human livers. This is not the case, and the work referred to is that of Shortt and Garnham. The abstract states that " The authors have never seen parasites in the parenchymatous cells of the liver comparable with the forms described by Shortt and Garnham ". It should continue " They [Telcharov and Todorowa] attribute the size of the schizonts described by Shortt and Garnham to the high glycogen content of the medium in which the parasite develops ".

Erratum

In the last paragraph of the abstract of the paper by Dowling, this *Bulletin*, 1952, v. 49, 367–8, the phrase " the total cost " should read " the total annual cost ".

Baldi, A. Sull'infezione da *P. berghei* (Vincke e Lips). [*P. berghei* **Infections**] *Riv. di Malariologia*. 1952, June, v. 31, Nos. 1/3, 41–52, 5 coloured figs. on pl. [60 refs.]

The English summary appended to the paper is as follows :—

" A review is given of the research work on infections with *P. berghei*, Vincke and Lips in mice and rats, with particular reference to mortality and the infecting power of the blood during successive stages of the disease. Mice cured by antimalarial drugs showed no resistance to a second infection and died of heavy parasitemia. A guinea pig subjected to splenectomy did not change its natural resistance to infection. Attempts to develop the sporogonous cycle in *A. maculipennis* var *atroparvus* failed. The presence of tissue forms of *P. berghei* in animals inoculated with blood is discussed."

TRYPANOSOMIASIS

Davies, R. G. **An Outbreak of Trypanosomiasis.** *Brit. Med. J.* 1952, July 26, 192–3.

In August 1948, an African man visited a sleeping sickness area west of Kisumu, Kenya Colony, for 3 days and returned to his village, Kibigori, 20

miles east of Kisumu ; in the following December he was admitted to Kisumu hospital suffering from trypanosomiasis. A survey of the Kibigori neighbourhood was therefore carried out by the author and 3 African assistants. The investigation was completed by April 1949 and included the examination of 362 Europeans and Asians and 11,533 Africans ; no European or Asian was found infected but there were 158 cases among the Africans and another 43 cases were found a month later ; all were treated. The clinical symptoms in man and the character of the infection in inoculated rats suggested that the infection was caused by *Trypanosoma gambiense*. *J. F. Corson*

Squire, F. A. **On the Sex Ratio in** *Glossina*. *Bull. Entom. Res.* 1952, July, v. 43, Pt. 2, 231–5.

It will be remembered that the author has already applied a system of " age grouping " to specimens of *Glossina palpalis* collected in Sierra Leone. It is based partly on changes in the colour of the wing and also on fraying of the hind margin. He has now marked, liberated and recovered some flies and finds that the insect may remain in age-group I " up to an average of about 32 days old " : indeed, one fly 45 days old was still in that age-group, and the range was from 17 to 45 days. Only one fly was found at the end of the second age-group, showing the first signs of fraying ; it was 85 days old. There is little direct evidence as to the duration of the third age-group.

The fact that males preponderate in captured samples of tsetse, and that the sex ratio varies according to the catching technique, has been well known for many years. The author records the sex ratio for flies of different age-groups. He shows that in the teneral flies the ratio male/female is 1 to 1. In all older flies the males predominate : in the non-teneral members of age-group I the ratio is 5 to 1, and in the age-groups II and III it is 5 to 1 and 2·7 to 1 respectively. [The author's view is that the females become " fugitive " in order to escape from the attentions of the males, the first pairing having certainly taken place very early in life and while the female was still teneral. On this point it appears that the author's reasoning is rather simple, for he seems to assume that when he cannot find the female flies they are also successfully lying hid from the males. But whether this theory is accepted or not he has certainly added some useful facts to what is known of the physiology of this insect. For instance, he has established that 5 per cent. of the females which he would attribute to age-group III contained no spermatozoa though they showed mating scars. This is interesting for it would be assumed in the light of previous knowledge that the female paired early in life and then remained fertile for the rest of her life. He has also dissected females, the uterus of which contained neither larvae nor mature eggs though the spermatheca contained active spermatozoa.]

[We are doubtless correct in assuming that the author's observations apply to *G. palpalis* in Sierra Leone, a point which is not stated in the text.]

P. A. Buxton

Leleup, N. Les bananeraies, biotopes de refuge pour *Glossina palpalis v. martinii* dans la Plaine de la Ruzizi. [**Banana Groves as Refuges for** *Glossina palpalis martinii* **in the Ruzizi Plain, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1952, Apr. 30, v. 32, No. 2, 161–3.

In the valley of the Ruzizi river between the lakes Kivu and Tanganyika the naturally woody vegetation has been largely destroyed to make way for cotton growing and the cultivation of bananas.

In the north there is still some original forest adjacent to the plantations but this is by no means the case in the south. Here the large banana plantations are

isolated from the forest by vast spaces entirely denuded except for an occasional *Borassus*. For example the two estates in the estuaries of the two branches of the river are separated by more than 15 km. and there is no cover for tsetse flies within 20 km. These plantations are refuges for *Glossina palpalis martinii* which is present in large numbers and the temperature, humidity and shelter conditions are quite suitable, though up to now no pupae have been found as the work has been temporarily suspended.

It seems that the plantations were gradually developed while the surrounding country was being deforested and the tsetse flies were in the course of time trapped in the banana plantations and cut off from their more normal habitats.

H. S. Leeson

SAUNDERS, G. F. T. **Diagnosis of Human Trypanosomiasis.** *Brit. Med. J.* 1952, July 26, 193–5. [17 refs.]

The author refers to a case of sleeping sickness recorded by CATES and MCILROY [this *Bulletin*, 1951, v. 48, 1089] ; [the patient was apparently infected in the Gambia about 1942 or 1943 and was admitted to St. Bartholomew's Hospital in May 1947 and was treated at this hospital several times during the following year, but the infection was not diagnosed until 1950 though suspected and treated as such late in 1948]. Saunders concludes that routine methods of laboratory diagnosis are not well known in England and therefore describes them in this paper ; they include examination of blood films, triple centrifugation of blood, lymphatic gland puncture, examination of the cerebrospinal fluid for trypanosomes, white cell count and protein content, and inoculation of susceptible animals. The adhesion test [Rieckenberg phenomenon] is also used. [These methods are generally practised in sleeping sickness areas in Africa.]

J. F. Corson

MONNET, A., BAYLET, R. & REYNAUD, R. Contribution à l'étude de l'élimination urinaire des dix-sept cétostéroïdes neutres chez l'Africain normal et trypanosomé. [**Study of the Urinary Elimination of Neutral 17-Ketosteroids in Normal Africans and in those with Trypanosomiasis**] *Méd. Trop.* Marseilles. 1952, May–June, v. 12, No. 3, 307–30, 6 graphs.

The following is a translation of the authors' summary :—

From this study, the following facts appear to emerge :

1. The urinary excretion of neutral 17-ketosteroids in normal Africans of the Bobo-Massi sub-group is slightly reduced in comparison with that in Europeans.
2. This reduction is more marked in leprosy. In the present state of our studies, it does not seem possible to state exactly what metabolic function is affected (testicular, hypophyseal or cortico-adrenal).
3. Males suffering from trypanosomiasis show a very clear reduction in excretion, while females are little affected, if at all. This would indicate a testicular affection which would seem to be almost irreversible.

[See also this *Bulletin*, 1952, v. 49, 604, 627.]

H. J. O'D. Burke-Gaffney

POTTS, W. H. & JACKSON, C. H. N. **The Shinyanga Game Destruction Experiment.** *Bull. Entom. Res.* 1952, July, v. 43, Pt. 2, 365–74, 1 fig.

An experimental study of the effect of game destruction upon the savanna species of tsetse in Tanganyika was planned by the late C. F. M. SWYNNERTON

but deferred owing to the outbreak of war in 1939 : the matter was taken up again in response to strong requests from the East African Standing Committee for Tsetse and Trypanosomiasis Research. The purpose was to discover whether *Glossina morsitans*, *swynnertoni* and *pallidipes* can be eradicated by destruction of hoofed game animals in Tanganyika and, if so, how long the operation would take and what it would cost. It was also decided to eliminate first the large game animals, to discover whether the tsetse could then maintain themselves on small antelope and pigs ; this object was in part defeated because the shooters could not be prevented from destroying a large proportion of the smaller animals, which it had been intended to leave alone during the first half of the experimental period. An opportunity was also taken to carry out studies on a tsetse community which had become hungry. The work was carried out in an area of uninhabited bush country of some 600 square miles accessible from the laboratory at Shinyanga. The area was protected by open grass country or by cultivation, both from invading tsetse and from movements of game : on one side a fence fifty miles long had to be erected to complete the isolation from moving game. The area and its surroundings are illustrated by a sketch map. Within it there was a considerable variety of vegetation, several of the types characteristic of the northern part of Tanganyika being represented. In this area giraffe, roan antelope, Bohor reedbuck, eland and impala were common and such animals as wildebeest, Thomson's gazelle and zebra wandered in from the grass plains. Rhinoceros was widespread and bush-pig, wart-hog, and a number of small antelopes were common. Several other types of animal had a local distribution in part of the area. The authors, whose knowledge of animals and of their territory gives great weight to their opinion, feel that it is reasonable to suppose that when the shooting began the area might have contained 500 giraffe, 300 roan antelope, 800 Bohor reedbuck and so forth. The small antelopes (duiker, dikdik, etc.) must have been at least as numerous as all the other animals put together. The conclusion is reached that at the beginning of the experiment there were some 6,000 ungulate animals in the 600 square miles. The density of game was similar to that of many other bushed areas in the same part of the world.

[It is noted that the authors have been at pains to give a careful description of conditions as they were before the start of the experiment.]

The actual destruction of game was carried out by Africans who were tested by shooting at targets before they commenced the work. There were between 50 and 100 of them, except at the end of the experiment when game became scarce. The Africans lived in small camps, usually with two men in each, they were given a low basic rate of pay with an additional sum based on the results. They were supervised by Europeans who lived in the experimental area. The destruction of game in a part of the area started in the middle of 1945, the whole area was involved by the end of 1946 and the operation ended at the end of 1950. In 1948 it became apparent that game animals from the grassy plains were invading the area on a considerable scale and a fence was then erected, after which it seems that no considerable immigration took place. The total number of animals known to have been shot was 8,554 ; they belonged to 20 species, apart from pig and small antelopes believed to have been shot contrary to orders. The list is headed by Thomson's gazelle (2,038), impala and Bohor reedbuck (over 1,000), topi and giraffe (over 600) and so forth.

The effect of this on tsetse is carefully considered. With regard to *G. swynnertoni* it has to be observed that long-term cycles in population are known to occur ; in a control area in which no shooting was being carried out comparable figures fell from 108 in 1946 to a minimum of 38 in 1948, after which they rose, never reaching 100. In the experimental area the comparable figure was 179 in 1946

which fell to 58 in 1947 and 7 in 1948. For the following three years the figure was below 1, indeed, no specimens were taken in 1951. The insects gave evidence of starvation ; for instance the fat content fell below normal and there was a significant and steady decrease in size (measured by the length of a certain part of the fourth longitudinal vein). There is evidence from other sources relating this measurement to the weight of the larva at birth, which in turn is known to be related to the nutrition of the mother. It is interesting to note that though the fly community was evidently suffering from hunger, only a very small proportion turned to feed on birds : after the fall in population had become established only one out of 83 flies specially examined contained nucleated red cells. Contrary to expectation the proportion of females caught by the fly boys did not rise with increasing signs of hunger. The information provided about *G. morsitans* and *pallidipes* is less complete and not so consistent. The first of these insects was exterminated in the experimental area ; of the second species, only 5 were captured in 1950 and a single specimen in 1951. The authors take these figures with considerable reserve because they were carrying out routine counts of these insects in two other blocks of woodland near Shinyanga : in one of these no great fluctuations in numbers occurred during the relevant period, but in the other the insect became so rare that months passed without a single one being captured.

From the end of 1950 onwards small numbers of uninfected cattle were placed in the experimental area, the blood being examined monthly and consistently shown to be negative for trypanosomes. The animals remained healthy. This critical test supports the authors' conclusion that *G. morsitans* and *swynnertoni* were exterminated by shooting the game, and that *G. pallidipes* either became very rare or was perhaps exterminated.

The cost of the experiment was £50 per square mile which is many times less than clearing the area would have cost and considerably less than the cost of discriminative clearing carried out to the point needed to destroy the three species of tsetse. The authors point out, however, that the fact that the area was almost isolated from invasion by fly and game greatly reduced the cost. If it had been necessary to erect much fencing, or to make wide fly-proof " barrier clearings " the cost would have been very formidable ; moreover, as the destruction of game does not alter the vegetation an area treated in this way remains liable to be re-invaded by tsetse unless, as in the present case, it is much isolated. In other words, the view is expressed that game destruction is not suitable except for isolated fly belts of manageable size. Though discriminative clearing costs more initially it is generally to be preferred because it alters the environment in a more permanent way. On that point the authors record that they have been impressed by the slowness with which bush regenerates to the point where it again becomes favourable to such an insect as *G. morsitans* : after discriminative clearing " at least some decades are likely to pass before the flies can return ".

As to whether the tsetse, of any of the three species, fed to any considerable extent on small antelopes and pigs, the authors can express no opinion.

P. A. Buxton

Akwei, E. **Planning the Control of Sleeping Sickness : a Sequel.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, July, v. 46, No. 4, 437–48, 2 maps. [15 refs.]

A sleeping sickness survey of the Lawra District (with a small part of the adjoining Tumu District) of the Northern Territories of the Gold Coast was made in 1949–50 ; during the preceding 10 years anti-tsetse measures had been carried out [Morris, this *Bulletin*, 1947, v. 44, 51 ; 1950, v. 47, 19] and

infected people had been treated with drugs, with the result that the apparent incidence of the disease fell steadily from 1·02 per cent. of the population in 1940 to 0·08 per cent. in the present survey. In the course of the survey 63 cases of sleeping sickness were found among 72,070 persons examined by the usual methods including gland puncture and examination of blood films ; another group of 5 cases (in one village) was found among 6,991 persons in the neighbouring Tumu District. The 63 cases in the Lawra District were distributed among 28 villages and 42 of them occurred in the south-eastern part of the District. The author concludes that " trypanosomiasis has ceased to be a public health problem in the Lawra-Tumu zone ". *J. F. Corson*

Lotte, A. J. **Commentaries on Sleeping Sickness.** *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 187/T.* Léopoldville (Congo Belge). 1952, Apr. 1, 28 mimeographed pp. [26 refs.]

Herin, V. **The Evolution of Trypanosomiasis in Bovines after Treatment with " Dimidium Bromide ".** *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 188/T.* Léopoldville (Congo Belge). 1952, Mar. 22. 8 mimeographed pp., 4 maps & 7 graphs.

Seneca, H. & Rockenbach, Joyce. **Fatal** *Trypanosoma cruzi* **Infection in the White Rat.** *Science.* 1952, July 4, 14–15.

For 10 years the authors have been able to produce no more than a mild and transient infection from the inoculation of laboratory animals with large numbers of *T. cruzi*. They now report the production of an acute fatal infection in baby white rats when 1–2 million *T. cruzi* in culture were injected intraperitoneally and the rats were simultaneously injected subcutaneously with 6·25 mgm. cortisone acetate, which was repeated in 24 hours.

Trypanosomes appeared within a week and increased to 25–100 per microscopic field in 3–4 weeks : a fatal parasitaemia appeared in some animals in 3 weeks and all had died from increasing muscular paralysis within 5 weeks.

Control animals, inoculated with *T. cruzi* alone, showed a mild parasitaemia after 2 weeks, which lasted for 10–14 days, with complete recovery. Controls receiving cortisone alone deteriorated, but survived. In the cortisone-trypanosome group there was marked parasitic invasion of the cardiac muscle and brain cells, moderate invasion of the bone marrow and liver and mild invasion of the spleen and lungs. Second and third passages to healthy baby rats given cortisone increased the virulence : the peak of parasitaemia was in 10–15 days and death occurred in 2–3 weeks.

Further studies are in progress and a complete report is promised.

H. J. O'D. Burke-Gaffney

Baernstein, H. D. & Rees, C. W. **Aldolase in the Culture Form of** *Trypanosoma cruzi.* *Exper. Parasit.* New York. 1952, June, v. 1, No. 3, 215–28, 7 figs. [23 refs.]

Pick, F. Sur la cristallisation biologique du sang ingéré par des réduvidés du genre *Triatoma* (*T. infestans* Klug, 1834), *T. megista* (Burmeister, 1835), *T. rubrovaria* (Blanchard, 1843), *T. brasiliensis* (Neiva, 1911). [**Biological Crystallization of the Blood Ingested by the Reduvid Bugs** *Triatoma infestans, T. megista, T. rubrovaria* **and** *T. brasiliensis*] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 326–8.

GALLIARD, H. & BOUTET, R. Chimiothérapie de l'infection à *Trypanosoma cruzi* chez les réduvidés, *Triatoma* et *Rhodnius*. Effets du traitement sur la virulence des formes métacycliques. [**Chemotherapy of Infections with *T. cruzi* in the Reduviid Bugs *Triatoma* and *Rhodnius*. Effect of Treatment on the Virulence of the Metacyclic Forms**] *Exper. Parasit.* New York. 1952, June, v. 1, No. 3, 263–73.

The authors [this *Bulletin*, 1951, v. 48, 720] investigated the effect of certain chemical agents on the development and virulence of *T. cruzi* infections in the mouse produced by scarification of the skin and application of metacyclic forms of the trypanosome from the dejecta of reduviid bugs. By this means it was claimed that a regular type of infection was produced in mice without fatal results. The prophylactic and curative effect of Bayer 7602 (diallyl-malondi(4-amino-2-methyl-quinolyl-6-amide)), lomidine (pentamidine) and Nivaquine (synonym given as chloroquine) [Nivaquine B=chloroquine and Nivaquine=sontoquine] on the alimentary infection of reduviid bugs has now been investigated. When bugs which had been infected for some months were fed on mice previously treated with varied doses of Bayer 7602 or lomidine, there was a temporary decrease in the number of metacyclic trypanosomes in the bugs but none was sterilized and some deaths occurred from the toxic action of lomidine. Infection was normal in the bugs when they were partly engorged on mice treated with the 3 drugs and then allowed to feed on infected mice. Lomidine again proved specially toxic to them. The dejecta of the treated bugs was infective to mice. It was previously claimed by the authors that Nivaquine and lomidine caused an increase in virulence in the mouse and that transitory phenomenon is again reported on infecting mice from the bugs around the 30th day after treatment, in this instance with Bayer 7602 and Nivaquine. *J. D. Fulton*

PELLEGRINO, J. & BRENER, Z. Profilaxia de um foco de doença de Chagas nas proximidades de Belo Horizonte (Cidade Industrial). [**BHC (Gammexane) Prophylaxis in a Focus of Chagas's Disease near Belo Horizonte (Minas Gerais—Brazil)**] *Rev. Assoc. Méd. Minas Gerais.* 1951, Sept., v. 2, No. 2, 233–50, 4 figs., 1 map & 1 folding plan. [24 refs.] English summary.

A focus of Chagas's disease in the environs of Belo Horizonte was made the object of experimental treatment. The predominant local vector of the disease is *Triatoma infestans*, an insect with close domestic associations, and the treatment consisted of the application of the residual insecticide BHC in the forms "Gammexane P-520" (6·5 per cent. gamma isomer) and "Lexone" (10 per cent.). Of 24 huts chosen for the experiment, 9 were sprayed with a water suspension of BHC to give a final concentration of 0·5 gm. of the active isomer per square metre, and 15 were sprayed with double this concentration. The results were assessed by a count of the triatomids knocked down, after the application of a pyrethrum powder. Weekly counts were made, and the total number of bugs collected fell from 1,566 in the first week to 25 in the fourth. After 3 to 4 months, a second insecticidal treatment was given, and in the following two months only 11 bugs were found. Full tabulated details of this work are given. There is also a useful account of the epidemiology of Chagas's disease in this locality. *A. J. P. Goodchild*

FEVERS OF THE TYPHUS GROUP

SIEGERT, R. Fortschritte in der Chemotherapie der Rickettsiosen. [**Developments in the Chemotherapy of Rickettsial Diseases**] Reprinted from *Arzneim.-Forschung.* 1951, Apr., v. 1, No. 1, 21–6. [137 refs.]

GIROUD, P. & GAILLARD, J. A. Les possibilités de diffusion d'une souche de typhus sporadique de type épidémique. [**The Possibilities of Spread of Infection from Sporadic Cases of Epidemic Typhus**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 350–57.

The authors have already seen in Paris 23 cases of sporadic typhus fever in which infection by contact with typhus patients could be excluded.

They describe the study of such a case in which there was a history of a previous attack of typhus fever 25 years previously so that there was a question of a late relapse. Twenty-five lice were allowed to feed on the patient ; once on the 3rd day, twice on the 4th day, and once on the 5th day of the fever. After fasting for 2 days the lice were fed by a specialist of the Weigl school. No development of rickettsiae occurred.

From blood of the patient taken on the 4th day a strain of rickettsia was isolated by guineapig inoculation ; very scanty Mooser cells were seen in tunica smears of the 2nd and 6th passages and orchitis occurred on the 1st, 6th and 9th passages. The sera of the guineapigs agglutinated epidemic rickettsiae at 1–10 to 1–80 but did not agglutinate murine strains, whereas serum of the patient on one occasion agglutinated murine and epidemic strains at the same titre and on two other occasions the epidemic titre was only twice as high as the murine.

Vaginal exudate from a guineapig of the 6th passage was inoculated intrarectally into lice, 80 per cent. of which began to pass rickettsiae in the faeces from the 7th or 3 following days. These faeces were used to inoculate other lice, 75 per cent. of which became positive on the 7th day. In later passages irregular results were observed ; first of all rickettsiae were found as early as the 3rd day, then passage through the lice became difficult and by the 8th transfer most of the lice were dying on the 2nd or 3rd day and the few survivors did not pass rickettsiae in the faeces. The strain was recovered by reverting to faecal smears of lice that had died on the 2nd day and from these a long series of passages was made in which rickettsiae appeared about the 7th day and the strain behaved in the usual way in all respects.

The authors' interpretation of these findings is that strains of *Rickettsia prowazeki* after surviving for long periods in man do not readily readapt themselves to transmission by lice and that this circumstance may explain the occurrence of epidemics of typhus in prison camps or prisons in the absence of outside sources of infection ; these had, up to now, been attributed to the murine strain, but were revivals of infection persisting in man since a previous attack. The termination of the epidemics is supposed to be due to the increasing virulence of the rickettsiae for the lice, which are thus destroyed for the most part, while any that survive cease to harbour the organisms which are destroyed by a veritable phenomenon of microbiophagy originally described by the authors.

In the discussion following the reading of the paper L. BRUMPT suggested that the inhibition of the rickettsiae in the bodies of the lice might have been due to the presence of immune bodies in the blood of the immunized persons on whom the lice were fed.

[The authors are hardly justified in stating that camp and institutional outbreaks of typhus of the above types had up to now been attributed to the murine strain.] *John W. D. Megaw*

WEYER, F. Das Problem der Brillschen Krankheit im Licht neuer Beobachtungen und Forschungsergebnisse. [**The Problem of Brill's Disease in the Light of Recent Observations and Experimental Findings**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 417–36. [Numerous refs.]

This is a comprehensive critical summary of the literature of Brill's disease. The bibliography contains about 80 references in each of which the title of the article is given in full. The views expressed by the author conform in general to those accepted by modern workers. Among the most important of these views is that the isolation of *Rickettsia prowazeki* from lice that have fed on patients suffering from Brill's disease shows that fresh epidemics of typhus fever may originate from such patients and that man can therefore serve as a reservoir of infection in inter-epidemic periods. [This is a reasonable hypothesis, but no example is given of any epidemic that has been shown to originate in this way or even of any case in which infection has been transmitted to a contact from a patient suffering from the disease.] *John W. D. Megaw*

WEYER, F. Versuche zur künstlichen Infektion der Schweinelaus *Haematopinus suis* L. mit *Rickettsia prowazeki* und *R. quintana*. [**Artificial Infection of *H. suis* with *R. prowazeki* and *R. quintana***] Reprinted from *Schweiz. Ztschr. f. Allgemeine Path. u. Bakt.* 1952, v. 15, No. 2, 203–16, 5 figs. [13 refs.]

The English summary appended to the paper is as follows :—

" 1. Hog lice (Haematopinus suis L.) were infected rectally with R. prowazeki. The invasion of the mid-gut cells is essentially similar to that seen in the infection of human body lice. Death of the hog louse occurs at a time when relatively few gut cells are invaded by rickettsiae ; this is possibly due in part to detrimental effect of the rickettsiae on the symbionts.

" 2. The intracoelomic inoculation of Haematopinus with R. prowazeki was followed by a profuse multiplication as is the case in Pediculus.

" 3. Attempts at infecting hog lice with R. quintana both by rectal and by intracoelomic inoculation were unsuccessful ; R. quintana thus exhibits a much narrower host specificity than R. prowazeki or R. mooseri, not only towards mammals but also towards blood-sucking lice."

GIROUD, P., LE GAC, P., GANZIN, M. & GAILLARD, J. A. Le typhus murin de l'Oubangui est grave, il mériterait le nom de tropical, son diagnostic peut être difficile, on peut y remédier par électrophorèse sur papier. [**Murine Typhus in Oubangui may be a Grave Disease, it Deserves the Name Tropical. Diagnosis, which may be Difficult, can be Facilitated by Electrophoresis on Paper**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 306–10, 3 figs. on 2 pls.

Two cases are described to show that murine typhus in Oubangui may be a severe disease and that the serological reactions may be so delayed as to be of little help in diagnosis. In one case, on the 13th and later unspecified days, the murine rickettsia-agglutination reaction was ++ 1–40 and the Weil-Felix (*OX19*) reaction was + 1–20 and ± 1–40, but on the 183rd day the former

reaction was ++ 1–320. Rickettsiae were seen in vaginal smears of a guinea-pig after several passages but the strain could not be isolated. In the other case the agglutination tests against epidemic, murine, boutonneuse and Q fever rickettsiae were negative on the 8th, 16th, 22nd and 32nd days after defervescence. In spleen smears of inoculated mice rickettsiae were seen on or just below the surface of cells or in vacuoles in the protoplasm of the cells.

By a process of micro-electrophoresis described by MACHEBOEUF in a paper still in the press, enough gamma globulin was obtained to enable the authors to carry out a microagglutination test, which was positive with murine rickettsiae at a titre of 1–250 and negative with epidemic rickettsiae. This result was the same as was obtained with the serum of a patient whose whole serum gave a murine rickettsia-agglutination reaction at 1–10,000.

The authors suggest that the abnormal serological reactions may be explained by the presence of a secondary infection by a virus or bacterium and that this special type of disease should be called " tropical murine typhus ".

John W. D. Megaw

MACDONALD, Etta M. & SCOTT, J. A. **Methods for feeding Tropical Rat Mites on Blood and other Fluids through a Membrane.** *Exper. Parasit.* New York. 1952, June, v. 1, No. 3, 283–90, 1 fig.

" A method for feeding tropical rat mites through a membrane is described. The thin portions of baby chick skin is the most easily obtainable membrane, but several other fresh animal membranes were equally successful. The mites accepted whole blood from several species of animals equally well and accepted diluted blood and plasma nearly as well as whole blood."

SILVA-GOYTIA, R. & ELIZONDO, A. Estudios sobre Fiebre Manchada en México. II.—Parásitos hematófagos encontrados naturalmente infectados. [**Spotted Fever in Mexico. II. Blood-Sucking Parasites Naturally Infected**] *Medicina.* Mexico. 1952, June 25, v. 32, No. 654, 278–82. [16 refs.]

The English summary appended to the paper is as follows :—

" From 83 lots of different species of ticks and lice collected around of Spotted fever patients at La Laguna, states of Coahuila and Durango, 3 of them were found naturally infected with Spotted fever agent. Also, serological and immunological evidence of the existence of Spotted fever agent in human lice was obtained.

" Those strains were isolated from specimens of Ornithodorus nicollei, Otobius lagophilus and Rhipicephalus sanguineus respectively.

" Guinea pig was found more suitable for the isolation of strains from ticks than the fertile chicken-egg 5–6 days old."

ANDRÉ, L., BEAUCHESNE, R. & MONTAUFFIER, R. E. Fièvre boutonneuse compliquée de rétinite. [**Boutonneuse Fever Complicated by Retinitis**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 310–13.

WORKMAN, J. B., HIGHTOWER, J. A., BORGES, F. J., FURMAN, J. E. & PARKER, R. T. **Cortisone as an Adjunct to Chloramphenicol in the Treatment of Rocky Mountain Spotted Fever.** *New England J. of Med.* 1952, June 19, v. 246, No. 25, 962–6, 3 figs. [26 refs.]

The authors report an excellent response to combined treatment with cortisone and chloramphenicol in 3 severe attacks of Rocky Mountain spotted fever in which the first doses of the drugs were given on the 7th, 10th and 13th

days respectively. In these cases the mean duration of the fever after the first doses was 2·4 days against 4·2 days for 6 similar cases treated with chloramphenicol alone [this *Bulletin*, 1951, v. 48, 540].

In 6 cases treated earlier, from the 4th or 5th day, the mean duration of the fever was only 1·4 days.

The dosage of chloramphenicol was 3·0 gm. initially and 1·0 gm. every 8 hours till the temperature had been normal for 48 hours. Children were given about two-thirds of these doses. Cortisone was given orally or intramuscularly in initial doses of 200 mgm. and in two further doses of 100 mgm. at 6-hour intervals. Children received two-thirds of these doses.

The authors, however, consider the routine use of cortisone to be ill-advised pending experience gained by a larger number of trials.

John W. D. Megaw

Ann. d. San. Pubblica. Rome. 1952, Jan.–Feb., v. 13, No. 1, 67–129, 7 figs. English summary. Seminario sulla epidemiologia della febbre Q in Italia. [**A Conference on the Epidemiology of Q Fever in Italy**]

Medical and public health workers from all over Italy took part in a conference on Q fever in October, 1951. Most of the points discussed have already been dealt with in papers by the members of the conference. [See, for example, the 7 papers reviewed in this *Bulletin*, 1951, v. 48, 798–800.]

The problem of Q fever is very important in Italy and it is being tackled with great energy. Since 1948 the disease has been found to occur throughout the country, with the possible exception of the southern part which has not yet been properly investigated. The highest incidence is in Central Italy where the occurrence of the disease has been confirmed in 13 of the 20 Provinces. The prevalence is highest in spring when contact between man and animals is closest and there is the special risk of infection associated with lambing.

Among the recommendations made by a committee which met after the conference were the following : the notification of cases in man and in animals when these were found to be serum-positive in association with human outbreaks : detailed investigation of selected outbreaks with the collaboration of the local doctors and veterinary surgeons : the standardization of the complement-fixation test which was regarded as the most useful method of diagnosis : the adoption of a set of regulations, already drawn up, dealing with veterinary policy ; and the development of research into the mechanism of contagion.

It can be expected that important additions will be made to knowledge of Q fever by the systematic investigations that are being planned.

John W. D. Megaw

Halawani, A., El Dine, K. Z. & El Fiki, A. Y. **Q-Fever in Egypt.** *J. Roy. Egyptian Med. Ass.* 1952, v. 35, No. 5, 339–46. [18 refs.]

The authors give a short account of the epidemiology and clinical aspects of Q fever with reference to the literature, and remark on the absence of reports of it in Egypt.

It is stated that Taylor *et al.*, in work as yet unpublished, obtained positive complement-fixation tests for Q fever in 16 of 26 sheep and 15 of 25 goats in Egypt. In human beings, there were more positives, and higher titres, in those under 5 years and also in females. Taylor *et al.* have also recovered *R. burneti* from *Hyalomma dromedarii* of camels and from *H. excavatum* of Sudanese bulls in Cairo.

The present authors carried out 500 complement-fixation tests on animals and human beings in Cairo. The results, given in a table, show that of 200 cows and buffalo cows 22 were positive in titres from 1/32 to 1/128. Positive results were also found in 4 of 15 goats, and 14 of 217 sheep. In 77 human sera, there were 11 positive results.

It seems therefore that Q fever is present in animals and man in Egypt and is possibly being missed because of inapparent cases, especially among children. The authors have written this paper to draw the attention of their colleagues in Egypt to Q fever. *H. J. O'D. Burke-Gaffney*

Lennette, E. H., Clark, W. H., Jensen, Florence W. & Toomb, Carolyn J. **Q Fever Studies. XV. Development and Persistence in Man of Complement-Fixing and Agglutinating Antibodies to** *Coxiella burnetii*. *J. Immunology*. 1952, May, v. 68, No. 5, 591–8, 3 figs. [17 refs.]

This is a valuable study of the problem of the relative values of the complement-fixation and rickettsia-agglutination tests for Q fever. Sera from 102 patients were examined by the fixation test and sera of 85 of these patients were also tested by the agglutination reaction at the same time. The number of persons tested simultaneously at the end of each of the first four weeks of the illness ranged from 20 to 49. Titres of 1–8 or over were regarded as positive. The percentages of patients yielding positive complement-fixation tests at the end of the 1st, 2nd, 3rd and 4th weeks respectively were 9, 65, 94 and 92 ; the corresponding figures for the rickettsia-agglutination tests were 50, 92, 95 and 100.

The median titres were much the same with both tests—they rose from less than 1–8 at the end of the 1st week to 1–32 or 1–64 in the 2nd week ; 1–128 or 1–256 in the 3rd and 4th weeks, then remained at the same level for about 6 months and declined slowly to 1–64 or 1–128 at 12 months and to 1–32 or 1–64 at 28 months. There was a very wide range of variation in individual cases ; for example 1–8 to 1–8,192 at 4 months and 1–64 to 1–2,084 at 8 months.

The findings suggest that the agglutination test has some advantages for early diagnosis, but the fixation test is said to be more readily adaptable to laboratory use, presumably because a complicated system of titration was adopted before the antigen was used for the agglutination test. Commercial antigen of the Henzerling type was used for both tests.

The long persistence of the antibodies indicates the need for caution in diagnosis unless repeated tests are carried out. *John W. D. Megaw*

Glücker, L. G. & Munk, J. **Roentgenologic Pulmonary Manifestations of Queensland Fever.** *J. Faculty Radiologists*. 1952, Jan., v. 3, No. 3, 186–92, 9 figs. [15 refs.]

"An analysis of the radiological characters of the pulmonary lesion of Queensland fever, based on the X-ray examination of the majority of 85 serologically proved cases, which occurred in the Haifa area during the first months of 1949, has been given.

"The dominating radiological feature has been seen to be a circumscribed, usually rounded, lesion of an exudative-pneumonic character. In addition structural intensification as a manifestation of interstitial inflammation has been noted, particularly in the later stages of the lesion, becoming most apparent in the stage of resolution.

"A short differential diagnostic study has shown that the pulmonary lesion of Q fever, being in its X-ray appearance of exudative-pneumonic character,

cannot be distinguished radiologically from the large group of lesions of this pathological type (primary tuberculous lesion, early tuberculous lesion (Assman), eosinophilic infiltration, etc.). There may sometimes be distinctive features, permitting differentiation from lobar pneumonia, these being mainly in extent, localization, and the density of the lesion.

"The pulmonary lesion of Q fever has been found to show distinctive differential characteristics from primary atypical pneumonia. The radiological features of this disease (the dominating interstitial infiltration manifesting itself in the first stage of the disease and lasting throughout all stages as structural intensification, the segmental distribution, and the commonly present lobular, segmental, or lobar atelectasis due to bronchial obstruction) have been found to be missing in Q fever."

RABIES

D'Silva, C. B., Brooks, A. G., Thomas, A. K. & Ahuja, M. L. **Studies on Rabies. V. Antirabic Vaccines prepared from Supernatant Fluid of Brain Emulsion in** *Distilled Water. Indian J. Med. Res.* 1951, July, v. 39, No. 3, 423–31.

The authors note that very little work has been done with rabies vaccines prepared from the supernatant fluid of fixed-virus brain emulsion. They present a series of completely documented experiments in which a comparison is made of the protection afforded by 5 per cent. whole-sheep-brain suspensions and 5 per cent. supernatant, each in 0·5 per cent. carbolized distilled water. The supernatant vaccines were usually prepared by centrifuging a 20 per cent. brain emulsion in distilled water for 30 minutes at 3,000 r.p.m. From their experiments they conclude that vaccines made from the supernatant fluid of a brain emulsion in distilled water are as effective (in laboratory animals) as vaccines made from whole brain, and that supernatant vaccine appears to evoke a quicker immunity response in laboratory animals than vaccine made in saline with whole brain. The carbolized vaccines in distilled water are likely to be superior to whole-brain suspensions since they afford good protection and the brain substance in the vaccine is reduced. *G. W. A. Dick*

Ahuja, M. L., D'Silva, C. B., Brooks, A. G. & Thomas, A. K. **Studies on Rabies. VI. Antirabic Serum and Antirabic Vaccine Treatment : Interpretation of Results in Laboratory Animals.** *Indian J. Med. Res.* 1951, July, v. 39, No. 3, 433–44.

"1. Immune serum prolongs the incubation period of rabies very considerably in experimental animals but the results, so far as survival is concerned, are disappointing when animals are observed for a period of not less than 90 days from date of infection with street virus.

"2. Serum in conjunction with vaccine gave irregular results. In actual practice a great deal will depend on (*a*) the dose of serum given and the time interval between administration of serum and of vaccine, and (*b*) between infection and commencement of treatment with serum.

"3. An important point brought out by these studies is that the true worth of a carbolized antirabic vaccine in the treatment of man cannot be estimated by experiments in small laboratory animals (mice and guinea-pigs). These animals develop rabies in about 20 days after infection with street virus, whereas the average incubation period of the disease in human beings bitten on

the face is 34 days. Animals treated after infection, with carbolized vaccines, usually die earlier because of the negative phase induced by the vaccine as shown by the shortened incubation period and greater mortality in treated animals compared with controls. When, however, the period from commencement of treatment to death is prolonged in laboratory experiments by starting vaccine treatment 4 to 6 days before infection the vaccine proves highly effective. It is because the importance of incubation period has hitherto not been sufficiently appreciated that workers have been puzzled to account for the amazingly bad results in experimental animals treated with carbolized vaccines, given after infection, and the highly satisfactory results obtained in man with the same vaccines in actual practice. In experiments on rabies with the usual laboratory animals (mice and guinea-pigs) the period from commencement of treatment to death (in controls) should be adjusted to about 30 days, to conform to the incubation period of a head bite in man ; alternatively, monkeys should be used in experiments on rabies and these should be infected, not by corneal scarification or injection of the virus into the muscles of the neck or masseter, but by injection into the hind leg or tail which will give an incubation period approximating to that of a face bite in man."

Béquignon, R. & Vialat, C. Les vaccinations antirabiques à l'Institut Pasteur en 1951. [**Anti-Rabies Vaccination in the Pasteur Institute in 1951**] *Ann. Inst. Pasteur.* 1952, July, v. 83, No. 1, 21–5.

This report follows on the lines of its predecessors [for the last, see this *Bulletin*, 1951, v. 48, 982].

Altogether, 96 people received treatment out of 262 seeking advice. The patients had been bitten in France (88) North Africa (4), Equatorial Africa (2) and Italy and Madagascar (1 each). Dogs (30 pets, 54 stray) were the common biting animals, followed by cats (10, 1) and 1 experimental rabbit. In 4 cases, rabies was confirmed in the biting animal by inoculation of laboratory animals and in 2 by veterinary examination. Two human brains were proved by histological examination to be infected.

In 56 cases the bite was deep, in 62 it was on the bare skin. In 53, the upper limbs were bitten, in 30 the lower, in 10 the head and in 3 the trunk.

Treatment was begun within a week in 81 cases and in 21 days in 15.

The patients came from 21 *départements*—55 were from the Seine and 10 from the Seine-et-Oise.

There were no deaths and no paralytic accidents. The usual table gives records since 1886 and it is noted that there have been no deaths after treatment since 1924 when there was one. *H. J. O'D. Burke-Gaffney*

Remlinger, P. Las parálisis del tratamiento antirrábico. [**Paralysis Associated with Antirabic Treatment**] *Med. Colonial.* Madrid. 1952, July 1, v. 20, No. 1, 3–9.

PLAGUE

Baltazard, M., Bahmanyar, M., Mofidi, C. & Seydian, B. Le foyer de peste du Kurdistan. [**Foci of Plague in Kurdistan**] *Bull. World Health Organization.* Geneva. 1952, v. 5, No. 4, 441–72, 5 figs. [25 refs.]

This is a description of an intensive survey of the epidemiology of plague in Kurdistan where conditions of life for man and rodents have remained constant

for many centuries and the authors believe that "archaeological" foci of "plague of the wilds" (*peste sauvage*) have persisted since ancient times. A remarkable feature of the region is the complete absence of domestic rodents, which apparently have not succeeded in crossing the mountain barrier surrounding the area. Two pronounced pockets of infection were discovered in which the reservoirs of infection were 3 species of *Meriones* belonging to the *Gerbillinae* ; these were everywhere the most numerous rodents in and near the foci of infection and in the whole area. In striking contrast to rats and some other rodents *Meriones* are relatively resistant to plague and so are not liable to be wiped out by epizootics but serve as reservoirs of persistent enzootic plague. In Kurdistan more susceptible rodents co-exist in smaller numbers ; these are only occasionally attacked. The authors' view is that everywhere in the world the highly susceptible rodents such as the marmot, the squirrel and even the rat are not the permanent reservoirs of the plague bacillus ; in their picturesque words the authors state that if the rat has made the fortune of plague it is not the original, and probably not even the actual, proprietor of the disease, but only its disseminator.

Attention was first called to the foci of infection in Kurdistan by the almost simultaneous occurrence of two explosive and self-limited epidemics of pneumonic plague, both of which lasted only 25 days. These occurred in clusters of remote villages ; in one there were 56 cases and 54 deaths, in the other, about 100 kilometres away, there were 22 cases and 21 deaths. The origin of the latter outbreak was a boy who was attacked by septicaemic plague after spending a day playing at an isolated mill where sacks of grain were stored. Among 37 *Meriones* found near the mill infection was found in 12, and infection was found in their fleas belonging to the genera *Nosopsyllus* and *Xenopsylla* ; these fleas were found experimentally to be capable of biting man and so were regarded as the transmitting vectors.

In the whole survey, which extended over a period of 4 years, the following rodents were found in and near the infected foci ; the numbers found are given in brackets. Three species of gerbillines, *Meriones persicus* (2,751), *M. shawi* and *M. libycus* (3,047) ; a spermophile, *Citellus fulvus concolor* (1,352) ; three *Microtinae, Microtus irani* (929), *Arvicola terrestris* (142) and *Ellobius lutescens* (129) ; the jerboa *Allactaga williamsi* (503), a mouse *Mus musculus bactrianus* (128) ; two species of hamsters, *Cricetulus migratorius* (69) and *Mesocricetus auratus* (57). A carnivore, the marten *Mustela altaica* (10) was also found.

The animals found infected were 69 *Meriones*, 2 *Allactaga*, 1 *Ellobius* and 1 *Mustela*. *Meriones* was regarded as the essential carrier.

John W. D. Megaw

MERCIER, S. Considérations sur un premier essai de traitement d'un cas de peste pulmonaire par la chloromycétine. [**Review of a First Attempt at Treatment of a Case of Pneumonic Plague by Chloramphenicol**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 402–8, 1 chart & 2 figs. on 2 pls.

A case of recovery from an attack of pneumonic plague is described in minute detail. About 24 hours after the onset, when the patient was already desperately ill, an intravenous injection of 1·0 gm. of injectable chloromycetin [chloramphenicol] was given ; this was followed in 1½ hours by a second similar injection and 3½ hours later 0·25 gm. of the drug was given by the mouth. The patient's condition continued to deteriorate and about 7 hours after the first injection the treatment was changed to streptomycin, given intramuscularly in doses of 0·5 gm. every 2½ hours for a few doses, then every 3 hours for about 24 hours and afterwards at progressively longer intervals so that on the 7th,

and last, day of the treatment the interval was 8 hours. Various other drugs were given, including penicillin and thiazamide. In the conditions described it was impossible to form an opinion with regard to the effect, if any, of the brief treatment by chloramphenicol.

In a further communication on p. 429 of the same journal the author describes the treatment of a case of septicaemic-bubonic plague by chloramphenicol. About 3 days after the onset an intravenous injection of 0·5 gm. was given ; this was followed by three further injections at intervals of 3 hours and then by oral doses of 0·25 gm. every 2 hours for one day and every 3 hours for a further period of about 8 days. There was a prompt response ; the temperature fell from 40°C. to 37°C. within 27 hours and there was only a slight rise afterwards associated with the development of the bubo. The total dosage was 19·75 gm. over a period of 9 days ; the patient's age was 17 years and his weight 37 kgm.

A dose of 1·0 gm. sulphadizaine had been given just before the first dose of chloramphenicol, but this was not regarded as having had any appreciable influence on the course of the illness. *John W. D. Megaw*

Silverman, M. S., Elberg, S. S., Meyer, K. F. & Foster, L. **Studies on Immunization against Plague. III. Quantitative Serological Studies on an Immunizing Antigen of** *Pasteurella pestis*. *J. Immunology*. 1952, June, v. 68, No. 6, 609–20, 4 figs. [30 refs.]

"1. A water soluble carbohydrate-protein immunizing antigen, Fraction IA isolated from *Pasteurella pestis*, was studied for its electrophoretic and serological homogeneity.

"2. Determination of the 50% immunizing dose of Fraction IA in mice showed that Fraction IA was a potent immunizing agent against infection with *P. pestis*. Twelve to 22 micrograms of the antigen were sufficient to protect 50% of the mice against 100 MLD of a highly virulent strain of the organism.

"3. The antigen preparations were electrophoretically inhomogeneous.

"4. Quantitative precipitin reactions showed that although the Fraction IA preparations were homogeneous on the basis of the analysis of the supernates, a serologically active minor component could be detected by absorption studies. However, the portion of the curves of the reaction for the zones of antibody excess and equivalence are believed to be the results essentially of the precipitation of Fraction IA and its antibody.

"5. The lack of complete inhibition of precipitation in the extreme antigen excess zone in the Fraction IA system was probably due, in part, to the serological activity of the minor component. However, removal of this component resulted in an increased but still incomplete inhibition of precipitation. This suggests that the carbohydrate moiety may be serologically active and may act in a manner similar to that of the pneumococcus polysaccharide.

"6. It is believed that the quantitative precipitin test, using a standard serum, can be used to assay preparations of *P. pestis* antigen by determining the amount of antigen required to bring the system to equivalence."

Reynes, V. Perspectives nouvelles dans la lutte contre le rat. Essais expérimentaux. [**New Perspectives in Rat Control**] *Méd. Trop.* Marseilles. 1952, Jan.–Feb., v. 12, No. 1, 73–80, 10 figs.

Experiments are described which demonstrate the possibilities of a new rodenticide, a dicoumarol derivative related to "Warfarin". The substance is a proprietary powder called "Tomorin" produced by the Laboratories J-R

Geigy of Basle and intended for use by being sprinkled on the runs and haunts of rodents to whose feet and hair it adheres so that it is swallowed by the animals when they make their customary toilet. In the experiments the powder was sprinkled on the cement floors of cages into which rats were introduced for periods of 30–60 seconds on one occasion or once daily till death occurred. Among 105 rats subjected to the trial none survived though some of the animals were exposed only once. When there was only one contact or two at most at a 24-hour interval death occurred among *Rattus alexandrinus* in 5–12 days, in *R. norvegicus* in 2–7 days, in *R. frugivorus* in 2–13 days, and in *R. rattus* in 2–14 days.

The special susceptibility of *R. norvegicus* was thought to be due to its collecting more of the powder on its long hairs and to its lower stance. Very young rats were relatively resistant, probably because they relied on their mothers for making their toilet but they succumbed soon after the death of the mothers.

The powder adheres firmly to the hairs of the rats and also to cement surfaces on which it remains active for at least a month, even after exposure to wetting. The rats do not avoid the treated surfaces and their death, which is peaceful, does not alarm their fellows.

Trials have been made in the Port of Marseilles, but no details are given of the results ; the author's recommendations are to apply plenty of the powder to the runs, taking care to avoid making any change in the surroundings, and to make a scanty application at first to suspected places so that the presence of the rats can be detected by their foot prints. The powder is left indefinitely, being renewed from time to time as required.

No mention is made of any risks connected with the use of the powder.

[It would be interesting to compare the efficacy of the powder with that of DDT and Gammexane, both of which have been used in the same way and both of which have the valuable property of being pulicides.]

John W. D. Megaw

Mercier, S. La prophylaxie de la peste au moyen des insecticides organiques de synthèse à Tananarive : premiers résultats. [**The Prophylaxis of Plague at Tananarive by Synthetic Organic Insecticides : First Results**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 409–24, 1 graph.

In 1947 contact insecticides of the DDT type were first employed in foci of plague in Tananarive (Madagascar), a town of 180,000 inhabitants among whom there had been 20 to 30 cases of the disease every year since 1943. Since October, 1949, when insecticide dusts began to be applied twice yearly to every house, there has been no case of plague. The numbers of cases reported yearly in the 10 years, 1941–50, were : 92, 10, 34, 22, 16, 27, 17, 15, 4 and 0.

Other evidence of the effect of the dusting campaign is that among 8,112 rats trapped in June–July, 1951, the *Xenopsylla cheopis* index was 0·05 as compared with indices ranging from 1·50 to 3·51 in 1945 and 1948.

Since 1947 no abnormal mortality has ever been observed among rats and no rat has been found infected with plague. These results are attributed to the 6-month combined operations of anti-malarial spraying of houses with DDT and the dusting of every building with a powder containing 5–10 per cent. of both DDT and BHC. A special application of the dust was made during the plague season, October to May, and in former foci of plague dusting was kept up at frequent intervals. The total cost of the anti-plague operations was about 1,600,000 francs yearly (about £1,700). Rat control by poisoning has been found impracticable, and trapping, which is continuous, has not reduced the rat population.

The author outlines a scheme by which the anti-plague operations could be extended to the village and rural communities at a trifling cost if these were combined with anti-malarial measures. *John W. D. Megaw*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Schubert, J. H. & May, M. C. **A Study of Organism *t* Antigen in the Routine Complement Fixation Test for Amebiasis.** *J. Lab. & Clin. Med.* 1952, July, v. 40, No. 1, 78–81.

"The data presented in this study showed that possibly nonspecific results were obtained with the antigen prepared from ameba grown in the presence of organism *t*. Accordingly, an organism *t* control should be included in the complement fixation test for amebiasis to help eliminate or identify such false positive reactions with ameba antigen prepared and used as described. Since antigens used at 1 : 8 dilution gave little reaction with organism *t*, as compared to the 1 : 4 dilution, it may be assumed that ameba antigens of still greater potency could be used without controls for organism *t*. Ameba antigens which titered to 1 : 64 were recently obtained from a laboratory supply house. However, organism *t* was not available for parallel testing with the commercial antigen to clarify this point."

Dorset, V. J. & Spriggs, J. B. **Diagnostic Difficulties relating to Amebiasis, with Five Case Reports.** *Ann. Intern. Med.* 1952, June, v. 36, No. 6, 1459–66, 6 figs.

Twenty-nine of 1,837 patients admitted to the U.S. Marine Hospital in Mobile, Alabama, had amoebiasis. Most of these 29 presented the usual picture and symptomatology of amoebic dysentery. Five of them were unusual, and their histories are given in detail. The first of these resembled a case of acute appendicitis, and on laparotomy amoebiasis and a retrocaecal pyogenic abscess were found. The second suggested a perforated peptic ulcer, but laparotomy showed a generalized peritonitis, and the patient subsequently died from a perforated amoebic ulcer of the colon. The third had an abdominal tumour, found on laparotomy to be an amoeboma. The fourth was suggestive of Laennec's cirrhosis of the liver, and turned out to be amoebiasis of the liver. The fifth had consolidation of the right lung base suggestive of pneumonia, but also turned out to be a case of amoebiasis of the liver. Treatment with amoebicidal drugs cured 4 of the 5 patients, but if proper stool examinations had consistently been made the death of the fifth patient might have been averted. The clinical diagnosis of amoebiasis may be very difficult, and a prompt and correct diagnosis is dependent on alertness and the knowledge that laboratory examinations are essential. *A. R. D. Adams*

Lenczner, M. & Dubash, J. **Intestinal Amoebiasis : a Rapid Method of Treatment with Aureomycin. Special Diagnostic Features.** *Indian Physician.* 1952, June, v. 11, No. 6, 117–22.

The authors claim that supravital staining with Janus Green is effective in differentiating *Entamoeba histolytica* from other amoebae. They state that oral treatment with aureomycin causes severe side-effects "in a very high percentage of cases". They used a suspension of 2 gm. of aureomycin in 4 oz.

of water as a retention enema, in conjunction with opium sedation, for periods of up to 48 hours. Of 30 patients so treated [according to a table] 29 were cured of their amoebiasis. *A. R. D. Adams*

SODEMAN, W. A., CHAUDHURI, R. N. & BANERJEE, D. **Terramycin in Active Diarrheal and Dysenteric Amebiasis.** *Ann. Intern. Med.* 1952, June, v. 36, No. 6, 1467–74.

Sixteen patients suffering from active diarrhoea or true dysentery, of amoebic origin, were treated with terramycin given orally. Six of the patients were treated in Louisiana and 10 in Calcutta. The dosage of terramycin varied from 0·75 gm. daily to 2 gm. daily for 7 to 10 days. In all the cases the diarrhoea markedly diminished within a couple of days of beginning treatment, and usually the stools were formed and free of parasites by the fourth day of treatment. In only one of the 16 patients was there a clinical and parasitological relapse before the course of treatment ended ; this latter was readily controlled by emetine. The follow-up was admittedly inadequate to assess accurately the cure-rate, but the immediate effect of treatment was good, and in only 3 of the 16 patients was the infection determined to be persistent after treatment. In 5 of the 16 patients there were toxic side-effects in the form of nausea and vomiting or diarrhoea. *A. R. D. Adams*

TAYLOR, D. Jane & GREENBERG, J. **Experimental Chemotherapy of *Endamoeba histolytica* Infections in the Guinea Pig.** *Amer. J. Hyg.* 1952, July, v. 56, No. 1, 58–70. [28 refs.]

The use of the guineapig as experimental host for *E. histolytica* infections produced by intracaecal inoculation of culture material has been recommended by CARRERA and FAUST [this *Bulletin*, 1950, v. 47, 465]. With this animal as host the present authors have studied the effect of 50 compounds, including the accepted amoebicides, antibiotics, two glycosides, quinoline derivatives, arsenicals, thiosemicarbazones, pyridines and pyrimidines, on the infection. Animals, of either sex, weighing 100 to 250 gm., were housed in separate cages and fed on a special diet fortified with vitamins. After separation into groups according to weight they were inoculated by the technique described by the authors [*ibid.*, 1951, v. 48, 639] with material from 24-hour cultures of *E. histolytica*. Ten animals were given treatment with each drug and appropriate controls were used. Oral treatment was begun a few hours before inoculation and was continued twice daily for 1 to 2 weeks, except that on occasions a single large dose was given. The observation period lasted 20 to 30 days and all caeca were examined on death or when the animal was killed. The character of the lesions and number of amoebae present were determined. [No indication is given whether any of the animals were naturally infected with amoebae.] The result of treatment was assessed by (1) average degree of infection, (2) survival rate and (3) survival index (calculated from the survival rate of treated and untreated animals in the same series). There was a similarity in the reaction of the guineapig and man to certain quinolines, arsenicals and emetine but a marked variation in the response of individual animals to the standard amoebicides emetine, diodoquin, carbarsone, chiniofon and vioform was apparent, and the infection was rarely eradicated. Some of the 9 antibiotics tested proved active but exhibited marked toxicity for the host, fumagillin being the most satisfactory from the therapeutic aspect. The glycoside simaroubidin showed the highest therapeutic activity of all the substances tested. *J. D. Fulton*

Déjou, L. & Carayon, A. Les dangers de l'abstention chirurgicale prolongée dans les abcès du foie. [**Dangers of Prolonged Abstention from Surgical Intervention in Liver Abscess**] *Méd. Trop.* Marseilles. 1952, May–June, v. 12, No. 3, 270–81, 4 figs.

An account of 6 cases and discussion.

Tronca, Marisa. Terapia delle protozoosi intestinali da flagellati ciliati e coccidi. [**Treatment of Flagellate and Ciliate Infections of the Intestine**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1952, Feb., v. 33, No. 2, 96–115. [83 refs.]

The English summary appended to the paper is as follows :—

" The author discusses the therapeutic means used in some intestinal protozoiasis : giardiasis, balantidiosis, coccidiosis, trichomoniasis and intestinal chilomastosis. He gives a short description of the clinical picture of each infection."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Leeson, H. S. **The Recorded Distribution of *Ornithodoros moubata* (Murray) (Acarina).** *Bull. Entom. Res.* 1952, July, v. 43, Pt. 2, 407–11, 1 fig. [34 refs.]

The author has examined critically many records of the occurrence of *Ornithodorus moubata* in Africa and has constructed a map giving the distribution of this tick. Since 1904 when Ross and Milne proved that *O. moubata* was the vector of *Spirochaeta duttoni* the tick has been recorded from many parts of Africa and appears to have spread from the arid regions of East Africa westward and southward so that it now occurs south of the Equator from the east to the west coast, and has been found at altitudes from sea level to 3,000 metres. *O. moubata* appears to be absent from all countries in Africa north of the Equator and west of longitude 30°E. Doubtful records of the occurrence of the tick, *e.g.*, from Zanzibar and Egypt, have been omitted from the map.

In constructing the map it was found that *O. moubata* was distributed in a linear way following lines of communication. This suggests that the ticks have been carried by man accidentally or intentionally. This latter possibility is supported by statements that Africans sometimes carry the tick with them when they are likely to be away from home for long periods, possibly allowing the ticks to feed on them so as not to lose their immunity to relapsing fever.

C. M. Harrison

LEPROSY

Bechelli & Rotberg. **Compêndio de Leprologia.** [Epitome of Leprosy]

This book is reviewed on p. 1089.

Brown, C. P. **Leprosy in Canada.** *Canadian J. Pub. Health.* 1952, June, v. 43, No. 6, 252–8.

Leprosy in Canada came under the control of the Dominion Government in 1906. Since 1815, total records show 369 cases, though there were other

cases treated in hospital, but probably fewer than the number in the records. There are two special hospitals, one at Tracadie in New Brunswick and one at Bentinck Island, 12 miles from Victoria, British Columbia. The records of the former show 318 cases of which 290 originated in New Brunswick, 4 in Nova Scotia, 1 in Prince Edward Island, 5 in Quebec, 6 in Ontario, 5 in Manitoba, 6 in Saskatchewan and 1 in Bermuda. Of these, 283 are described as of French origin. In Bentinck Island from 1892 onwards there have been 51 cases, of which 46 originated in British Columbia.

The disease is supposed to have first been introduced to New Brunswick either by Norwegian sailors or, more likely, by the original settlers from Normandy, which was a leprous district. The Acadians [Acadia was the original name for Nova Scotia] "have been blamed for introducing leprosy into Louisiana when deported from Canada in 1775. This would indicate that the disease had previously existed among them in an unrecognized form". Reference is made to the account of the introduction of leprosy given in *Leprosy*, ROGERS and MUIR [this *Bulletin*, 1925, v. 22, 256].

Attention was first drawn to leprosy in British Columbia in 1882 by an attempt of some Chinese to hang and burn one of their countrymen who was suffering from leprosy. Dr. SMITH came from Tracadie and confirmed the diagnosis of leprosy in 5 cases. In 1862 forcible segregation ceased in New Brunswick, and a humane administration was introduced, patients being segregated voluntarily under medical officers and nursing sisters, while medical officers kept a close watch on leprous families. Confidential examinations are made without the knowledge of the general public. Canadian law since 1906 provides for compulsory treatment in Dominion Government hospitals, but the Act is also permissive in effect. "The inexperience of medical practitioners with this disease has resulted not infrequently in the loss of precious years while the basic condition progressed. Especially misleading is the fact that these patients frequently give positive Wassermann reactions.

"It should be noted that the disease has never appeared among the native Indian population, nor among the native-born of Oriental race who have lived continuously in Canada." *Ernest Muir*

KHANOLKAR, V. R. **Studies in the Histology of Early Lesions in Leprosy.** *Leprosy in India.* 1952, Apr., v. 24, No. 2, 62–77, 2 text figs. & 30 figs. (17 coloured) on 14 pls. [26 refs.]

[See this *Bulletin*, 1952, v. 49, 56.]

KHANOLKAR, V. R. & RAJALAKSHMI, K. **A Method for Concentration of Acid-Fast Bacilli in Skin Biopsies from Leprosy Patients.** *Leprosy in India.* 1952, Apr., v. 24, No. 2, 47–61, 5 figs. (3 on pl.)

A biopsy of 5×3×5 mm. is taken from a selected area of skin. [Of the three dimensions the depth is probably 5 mm., though it is not mentioned.] After soaking for 4 to 8 hours in 1 per cent. acetic acid, the epithelium is removed and discarded. The remainder is dropped into a homogenizer tube containing 3 cc. of 1 per cent. acetic acid, and crushed at about 2,000 r.p.m. with an electrically operated mechanical glass crusher for 5 to 10 minutes, or till a homogeneous milky emulsion is formed. The emulsion is shaken up with 20 drops of petroleum-ether—sulphuric-ether mixture (1 in 10). The tube is corked and left for 15 to 20 minutes, and then the sides of the tube are washed down with 10 cc. of distilled water. After 5 minutes a disc is formed at the surface, which contains all the bacilli.

Eight drops are removed with a 3 mm. platinum loop and spread on a slide over an area of 2×2 cm. The slide is dried (protected in a Petri dish) in an incubator at 37°C. The smear is fixed for 15 minutes in Carnoy's fixative, which is then poured off. Staining is done by a slight modification of the Ziehl-Neelsen method.

The results are given of 50 cases, of which no bacilli could be found by the ordinary methods in 36, and only a few in 14. In all of these, bacilli could be found by the above method ; in some there were considerable numbers. Illustrations are given of the apparatus used, and photomicrographs of one case showing the marked increase in the number of bacilli found as between the old and the new method. Controls were furnished by 16 cases from the Cancer Hospital. The biopsies from these, the same method being used, were all bacteriologically negative, except one in which the biopsy had been taken from skin near a fungating cancer of the maxilla, where 3, and later 8 bacilli were found ; " these were most probably contaminating acid-fast organisms which had entered through the neighbouring massive ulcerating tumour ".

Ernest Muir

Gohar, M. A. **A Note on Fluorescence Microscopy in the Diagnosis of Leprosy.** *J. Trop. Med. & Hyg.* 1952, July, v. 55, No. 7, 156–7.

" In examining scrapings from the nasal mucosa of early cases of leprosy a slightly higher percentage of positives is obtained by FM than the ZN method, provided that adequate care is taken to avoid decolorization. However, because of certain difficulties and factors discussed, this method seems to have little advantage over the ZN method."

Gollerkeri, P. G., Gokhale, B. B. & Ranade, S. N. **Some Observations on the Behaviour of the Wasserman and Kahn Tests (S.T.S.) in Leprosy and Tuberculosis.** *Indian J. Med. Sci.* 1952, June, v. 6, No. 6, 357–63 [14 refs.]

The reasons for the so-called " false positives " found in serum tests in non-syphilitic cases of leprosy and tuberculosis are discussed. Two possible hypotheses are put forward : (1) a disturbance of the albumin/globulin ratio in the blood ; (2) an excess of lipoid which develops a lipoid-specific antibody, the latter adding up with the globulin antibody to give positive reactions as in syphilis. The excess of lipoid in leprosy and tuberculosis is suggested as being connected with the lipoid-containing sheaths of their respective organisms.

Of 285 cases of clinical leprosy 71 (24·9 per cent.) gave positive W.R. or Kahn results, or both. It was found that the serologically positive results were more common in cases with high bacteriological findings, and negative lepromin tests. In 17 cases of active pulmonary tuberculosis, without either leprosy or syphilis, there were 8 with positive serological findings. In 9 cases of tuberculous meningitis, of the spinal fluids put up for the W.R. test, all were negative, while of 24 similar tests in leprosy cases in which blood tests were positive, 6 gave positive and 1 doubtful reactions with the cerebrospinal fluid. Three of these 7 gave no clinical history of syphilis. *Ernest Muir*

Torrella Gil, D. E. Estudio comparativo de las modernas medicaciones antileprosas. [**Comparative Studies of Modern Drugs in Leprosy**] *Rev. " Fontilles ".* Valencia. 1952, Jan., v. 3, No. 1, 21–52, 38 figs. on 18 pls. [76 refs.]

de Wildeman, É., with the collaboration of L. Pynaert. À propos de médicaments antilépreux d'origine végétale. VII. Sur des espèces de genre *Eucalyptus*

l'Héritier. [**Drugs of Vegetal Origin Used in Leprosy. VII.** *Eucalyptus* **spp.**] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales.* Mémoires (in-8°). 1947, v. 16, No. 5, 123 pp. [**VIII.** *Acacia* **spp.**] *Id.*, No. 6, 77 pp. [**IX.** *Capsicum* **spp.**] *Id.*, 1948, No. 8, 56 pp. [**X.** *Albizzia* **spp. and** *Cassia* **spp.**] *Id.*, 1948, v. 17, No. 3, 57 pp. [**XII. Genera of the Family Leguminosaceae**] *Id.*, No. 4, 114 pp. [**XIII. Species of Various Genera**] *Id.*, No. 5, 100 pp. [**XIV. Species of Various Genera**] *Id.*, 1949, v. 18, No. 1, 94 pp. [**XV. Species of Various Genera**] *Id.*, No. 2, 59 pp. [References throughout in footnotes.]

Sato, S. **Studies on the Chemotherapy of Leprosy. I. Cepharanthin.** *Tohoku J. Exper. Med.* 1952, Apr. 25, v. 55, No. 4, 341–7, 1 fig. [13 refs.]

"1. Cepharanthin is not so effective in the treatment of leprosy and is not to be compared with chaulmoogra oil or sulphone drugs.

"2. Cepharanthin shows neither curative nor preventive activity on the experimental rat leprosy."

Sato, S. & Chida, F. **Studies on the Chemotherapy of Leprosy. II. Koha.** *Tohoku J. Exper. Med.* 1952, Apr. 25, v. 55, No. 4, 349–53, 2 figs. [13 refs.]

"1. Koha No. 1 or Lumin and Koha No. 12 which belong to phothosensitizing cyanine dyes are not so effective in the treatment of leprosy and are not to be compared with chaulmoogra oil or sulphone drugs.

"2. All of these drugs give no influence on the course of experimental rat leprosy."

HELMINTHIASIS

Prieto Lorenzo, A. El parasitismo intestinal por vermes entre la población huertana del Jarama (Madrid). [**Helminthic Infection in Gardeners in Jarama (Madrid)**] *Med. Colonial.* Madrid. 1952, July 1, v. 20, No. 1, 10–19, 1 chart. [12 refs.]

The following is a translation of the author's summary :

An investigation into the presence of intestinal worms in gardeners in Jarama revealed that in 60·62 per cent. of them helminthic parasites were present. In 22·5 per cent. the parasite was *Ancylostoma duodenale*, in 21·87 *Enterobius vermicularis*, in 9·37 *Ascaris lumbricoides*, in 3·75 *Trichuris trichiura*, in 0·62 *Taenia saginata*, in 0·25 *Hymenolepis nana* and finally, the curious finding was observed of 2·25 per cent. *Heterodera marioni*. Worm infection reached a considerable figure. Cases of parasitization by more than one worm were less frequent. *H. J. O'D. Burke-Gaffney*

i. Japan Logistical Command Bull. No. 2. [Prepared by 406th Med. Gen. Lab., APO 500] 1951, Sept., 20 mimeographed pp., 1 map. [37 refs.] **Parasitological Studies in the Far East. VII. An Epidemiologic Survey of Southern Korea** [Hunter, G. W., Ritchie, L. S., Chang, I. C. *et al.*].

ii. Japan Logistical Command Bull. No. 3. [Prepared by 406th Med. Gen. Lab., APO 500] 1951, Oct., 29 mimeographed pp., 3 figs. [26 refs.] **Parasitological Studies in the Far East. XI. An Epidemiologic Survey of Okinawa, Ryukyu Islands** [Hunter, G. W., Ritchie, L. S., Pan, C. & Lin, S.].

iii. Japan Logistical Command Bull. No. 4. [Prepared by 406th Med. Gen. Lab., APO 500] 1951, Dec., 51 mimeographed pp., 11 figs. [24 refs.] **Parasitological Studies in the Far East. XIV. Summary of the Common Intestinal and Blood Parasites of the Japanese.**

These three Bulletins, which have been received separately at the Bureau, represent parts of the extensive series of Parasitological Studies in the Far East, sections of which have already appeared elsewhere and have been summarized in this *Bulletin* [see, for example, 1952, v. 49, 523, 633, 881]. They have been produced by the 406 Medical General Laboratory [U.S. Forces] of the Japan Logistical Command and their appearance under single covers represents a considerable contribution to the knowledge of parasitic infections in the areas concerned.

Each report follows a more or less common pattern, with variations according to local conditions and comprises such features as descriptions of the areas, hygiene, habits of the people, insect vectors and epidemiological findings. The results of examinations for parasites are shown in very great detail in numerous tables in terms of localities, communities, age, sex, occupation, degree of infestation and the like. Maps and figures aid greatly in identifying the numerous districts and prefectures which were surveyed separately.

The whole contains a mass of useful information which cannot readily be summarized, and to which those interested are referred, but the following points in each case are of special interest.

i. In Southern Korea, the survey was made on 919 persons in 9 population centres of 5 provinces and in the smaller island of Cheju-Do. In all, 94·5 per cent. were parasitized ; 94·2 per cent. had helminths and 33·4 protozoa.

Ascaris (82·4 per cent.) and *Trichuris* (81·1) were the most prevalent. They were found rather more frequently than in Okinawa and Japan, but clinical evidence of hookworm disease was rare.

Hookworms were found in 46·5 per cent. and *Trichostrongylus* in 23·6. *Strongyloides* was rarely found. In 84 children examined, *Enterobius* was found in 20·2 per cent.

Clonorchis averaged 7·1 per cent. but reached from 11·1 to 41·1 per cent. in three areas.

There was no previous record of schistosomiasis or of the snail host, nor were any found.

In stool examinations, *Paragonimus* was found in 1 per cent. Among the protozoa, *E. histolytica* was 5·0 per cent., *E. nana*, 8·3, and *Giardia* 3·5 per cent. Protozoa were more common in rural communities.

P. vivax malaria was found in 16 of 534 persons examined (3 per cent.). The principal vector is *Anopheles hyrcanus sinensis*.

Of 57 blood films examined for evidence of filariasis, 2 were positive for *W. malayi*, both from Cheju-Do.

ii. In Okinawa, parasites were found in 90 per cent., 88 per cent. having helminths and 40 per cent. protozoa. Hookworm (72 per cent.) and *Strongyloides* (13 per cent.) are believed to be encouraged by the method of cultivation of sweet potatoes, which were commonly fertilized with night soil. The parasite density for hookworm was higher than in most parts of Japan and Korea.

Ascaris (48 per cent.) was much less common than in Japan, but individual infections were heavy. *Trichuris* amounted to only 20 per cent. *E. histolytica* at 13·4 per cent. was one of the highest incidences of these surveys. In certain areas, contamination of food and drink appeared to be heavy.

Malaria (*P. vivax*) was found in 4·8 per cent. compared with 0·4 per cent. in 1945. The incidence was lower in the Southern half of Okinawa, possibly because of malaria control undertaken by military units.

Filariasis (*W. bancrofti*) amounted to 9·6 per cent.

There were only two cases of schistosomiasis found, one of *S. mansoni*, and one of *S. japonicum*. Each patient had been in endemic areas outside the island. No snail host could be found and there was no evidence of endemicity.

There were "a few autochthonous cases" of *Clonorchis*, and *Paragonimus* infection.

iii. The survey in Japan attempted to cover the separate islands, in prefectures. Separate findings and summaries are given for Hokkaido, Honshu, Shikoku and Kyushu. Very considerable detail is presented.

In general, helminthic infections were widespread, but the number of severe cases was at a minimum. *Ascaris* was usually dominant, followed by *Trichuris* and hookworm. In two communities *Trichostrongylus* amounted to 80 per cent. but it was less prevalent west and south of Yamanashu Prefecture.

S. japonicum was limited to the 5 endemic areas recognized by the Japanese. The Kofu and Kyushu areas are probably the largest and most widely infected. *Clonorchis* was widespread and was endemic in some areas, *e.g.*, Okayama and the Tone River Valley. *Enterobius* was present in 45 per cent. of 3,000 children.

The incidence of protozoa in general did not greatly exceed that of the temperate zone of the western hemisphere. High and low rates were found in different areas and it is believed that extremes of incidence are to be attributed to water. In three surveys, *E. histolytica* was about 10 per cent., in five others it was 5 per cent. or less. It was approximated by the incidence of *Giardia*, but *E. nana* was twice as common.

[These reports contain a very great deal of factual information.]

H. J. O'D. Burke-Gaffney

Lippi, M. Manifestazioni patologiche a carico dell'apparato respiratorio causate da alcune elmintiasi umane. [**Pathological Manifestations in the Respiratory Tract Caused by Certain Helminths**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1952, Jan., v. 33, No. 1, 11–53. [46 refs.]

The English summary appended to the paper is as follows :—

"The author reviews the literature on pathological manifestations in the respiratory apparatus due to human helminthiasis : 2 cosmopolitan intestinal helminthiasis (ascariasis and ancylostomiasis) and 2 tropical helminthiasis (bilharziasis and paragonimiasis).

"Particularly in some atypical cases of pathological manifestations in the respiratory apparatus the parasitical etiology of the disease should be carefully considered."

Bouillon, A. Bibliographie des schistosomes et des schistosomiases (bilharzioses) humaines et animales de 1931 à 1948. [**Bibliography of Schistosomes and Schistosomiasis in Man and Animals, 1931–1948**] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales. Mémoires.* (Collection in-8°.) 1950, v. 18, No. 5, 141 pp., 1 chart.

Kuntz, R. E. *Schistosoma mansoni* **and** *S. haematobium* **in the Yemen, Southwest Arabia : with a Report of an Unusual Factor in the Epidemiology of Schistosomiasis mansoni.** *J. Parasitology.* 1952, Feb., v. 38, No. 1, 24–8, 1 fig. [11 refs.]

"1. The first medical survey of the Yemen, S.W. Arabia has confirmed earlier, rather indefinite, reports that both *Schistosoma mansoni* and *S. haematobium* occur in the Yemen.

"2. *S. mansoni* is very common at Ta'izz, the provisional capital of the Yemen located at 4100 feet, but is of less concern at Hodeida on the Red Sea coast or at San'a the Yemen's largest city, on the highland plateau at 7200 feet.

"3. *S. haematobium* is found principally at Ta'izz. Numerous cases of infection by the latter schistosome originate in Eritrea.

"4. Observations made on limited numbers of persons during January and February of 1951 in the Yemen indicate that the majority of cases of schistosomiasis mansoni are probably contracted in the ablution basins of mosques. This is the first report showing a clearcut relationship between religious practices and schistosome infection. Such a pattern is unique in the epidemiology of schistosomiasis."

ZAKY, H. A. **Aneurysm of the Pulmonary Artery due to Schistosomiasis.** *Dis. of Chest.* Chicago. 1952, Feb., v. 21, No. 2, 194–204, 9 figs.

After an account of the cardiovascular, pulmonary arteriolar and periarteriolar, and parenchymatous changes that may develop in the lungs in association with infections with *Schistosoma mansoni* and *S. haematobium* in Egypt, the author briefly records the findings in 6 cases of schistosomal aneurysm of the pulmonary artery which he has encountered during a period of 5 years. The details should be sought in the original by those interested.

A. R. D. Adams

EDITORIAL NOTE

With reference to the paper by J. M. WATSON on Seasonal Variation of the Vector Snail, *Bulinus truncatus* [this *Bulletin*, 1952, v. 49, 413], Professor Watson has pointed out, in a personal communication, that he attaches considerable ecological importance to the difference between the threshold of emergence and the threshold of hibernation of the snails and that this can only be made clear by stating the exact levels to which the temperature falls before hibernation begins. The temperatures in question are stated in the original paper and the second-last sentence of the abstract now beginning "When the temperature falls below 25°C. towards the end of November, the snails go into hibernation" should therefore be amplified to read "When the temperature falls towards 15°C. in central Iraq and 17/18°C. in southern Iraq towards the end of November, the snails go into hibernation".

See also p. 1074, GELFAND and BARNETT, **A Peculiar Syndrome of "Bladder Paralysis" in Natives of South Central Africa.**

PITCHFORD, R. J. **Intestinal Bilharziasis in the Eastern Transvaal. A Preliminary Report.** *South African Med. J.* 1952, June 28, v. 26, No. 26, 524–8, 4 figs.

S. mansoni infection is recognized in the Eastern Transvaal and the author refers to surveys quoted by GITLIN *et al.* [this *Bulletin*, 1949, v. 46, 751]. There would not seem to be any certainty as to extent of the disease and the degree to which it affects the local Africans.

The present survey covered a small area of low-veld bush country in the Eastern Transvaal, ranging in altitude from 600 to 2,500 feet above sea-level and with an annual rainfall of 15–30 inches. There are few rivers with permanently flowing water, but there are many canals and dams built for irrigation.

The survey concerned 819 African children of 5–18 years in 18 schools. Single examinations of stools were made by a concentration technique and

spleens and livers examined with the subject supine : degrees of enlargement were recorded in both cases after the method used by HACKETT in malaria surveys. The technique is described and the method of recording figured. A primary object of the survey was to study the degree to which *S. mansoni* infection might be producing gross pathological changes in the liver.

It is considered that the results of a single stool examination give a good indication of the intensity of infestation in any one group in any one area : the overall percentage intensity was 36·1 (range, 2·3 to 73·4 per cent.).

In no area was no enlarged liver found. There was no apparent correlation between enlargement of the liver and of the spleen, but enlarged liver rates could be correlated with *S. mansoni* intensity in any one area. There did appear to be a similar rise in spleen rates, but these were complicated by the presence of endemic malaria. No significant sex differences were found.

The results of liver palpations are shown in 3 figures, in terms of sex and age and in relation to the intensity of *S. mansoni* infestation.

There was a proportional rise in large livers with increasing *S. mansoni* intensity over all ages, but a proportional drop in large livers with increasing age : the *S. mansoni* intensity still tended to rise with age. The author concludes that an enlarged liver rate depended on *S. mansoni* infestation and the ages of the particular group examined : on the other hand, *S. mansoni* infestation itself was not dependent on the age of the group.

The author excludes malaria as a cause of the enlarged liver rates, because of the size of the livers and the absence of correlation with spleen rates : malnutrition is also excluded, as the overall malnutrition picture was the same throughout the area.

The results in each area are described in detail. With one exception, all places with high infestation (50 per cent. or more) were in the Kaap Crocodile river valley, which is highly canalized, has many small dams and a dense population of *Lymnaea natalensis, Planorbis pfeifferi* and *Physopsis africana*. It was clear that these essential factors determined the height of *S. mansoni* infestation in the different areas, for example, European farming areas were highly canalized, with many snails and intensity rates were 40 to 73 per cent. Much lower rates were found in many Native Reserve and urban areas. Opportunities for pollution of water were maximal.

The author suggests that an enlarged liver rate among children in any given area could be of value in assessing the intensity of *S. mansoni* infestation, " other causes of mass hepatomegaly being equal ". It is however admitted that exceptions were found, which might have been due to age distribution or, equally, to unknown factors.

Figures are given to suggest that *S. haematobium* infection, highly endemic in the area, was not responsible for hepatomegaly in the children.

[Some of the arguments set out are not quite clear to the abstracter : particularly, in the light of the complicated factors involved in liver enlargement in Africans, the term " other causes of mass hepatomegaly being equal " is perhaps, in practice, an over-simplification.] *H. J. O'D. Burke-Gaffney*

STANDEN, O. D. **Experimental Infection of** *Australorbis glabratus* **with** *Schistosoma mansoni*. **I.—Individual and Mass Infection of Snails, and the relationship of Infection to Temperature and Season.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 48–53, 2 figs.

During the years 1949 and 1950 the author exposed some 13,500 *Australorbis glabratus* to infection with an Egyptian strain of *Schistosoma mansoni*, at the rate of 100–150 snails per week. The technique used is described as follows :

" Snails were infected when 8–10 weeks old. Each week snails of suitable size were separated into three numerically equal groups, A, B, C. In group A each snail was infected individually with six miracidia hatched from eggs passed in the faeces of parasitized mice. The miracidia were added to 2 c.cm. of water in 3×1 in. specimen-tubes, and one snail was then placed in each tube. The temperature was maintained at 28°C. The tubes were left undisturbed for at least six hours, and thereafter the snails were transferred to an aquarium. In group B the procedure was varied by placing a number of snails in a beaker containing 10 c.cm. of water for each snail and by adding six miracidia per snail. The object of using only 2 c.cm. of water per snail in the first group was to confine the miracidia within the vicinity of the snail, whilst the 10 c.cm. used for the second group gave greater freedom of choice. Group C snails were placed in an aquarium before exposure to infection, and miracidia were added to provide six per snail. In this group the volume of the aquarium was adjusted to give 500 c.cm. of water per snail.

" Examination of snails for cercarial production began 20 days after exposure to miracidia and continued twice weekly thereafter. Infected snails were pooled and were used for routine cercarial production. Examination of snails to isolate infected individuals continued for up to 72 days after exposure. Only snails that produced cercariae were deemed to be infected. No attempt was made to determine whether those that died were infected or not. The mortality-rate was based on the number of snails that died without producing cercariae."

The subsequent examination of the snails thus exposed to infection showed that a materially greater proportion of infected snails resulted when the miracidia were closely confined within the vicinity of each snail. The rates of infection in 1949 in groups A, B and C were, respectively, 49 per cent., 39 per cent., and 34 per cent., in 1950 82 per cent., 72 per cent. and 67 per cent. It will be noted that a much higher proportion of snails became infected in all groups in 1950 than in 1949, and this increased rate of infection was traced to the fact that in 1950 the aquaria harbouring the snails were maintained at a higher average temperature and reached higher maximum temperatures than in 1949. It was found that a minimum temperature of 26°C. was necessary for adequate sporocyst development, and that the optimum temperature for the culture of *S. mansoni* in *A. glabratus* was between 26° and 28°C. [Gordon, Davey and Peaston (this *Bulletin*, 1935, v. 32, 237) found the optimum temperature for rapidity of development of *S. mansoni* in *P. pfeifferi* to be 32° to 33°C.] *R. M. Gordon*

Gordon, R. M. & Griffiths, R. B. **Observations on the Means by which the Cercariae of *Schistosoma mansoni* penetrate Mammalian Skin, together with an Account of certain Morphological Changes observed in the Newly Penetrated Larvae.** *Ann. Trop. Med. & Parasit.* 1951, Dec., v. 45, Nos. 3/4, 227–43, 3 text figs., 9 diagrams & 15 figs. (3 coloured) on 5 pls. [24 refs.]

The results of experimental work here described and illustrated are an extension and clarification of present knowledge of the behaviour and morphology of *S. mansoni* cercariae during the skin-penetrating phase of their life-cycle. Some observations were also made on the intra-molluscan phase of the cercariae.

The paper is largely concerned with the number and function of the cephalic glands. The authors never observed more than 5 pairs in shed cercariae, but in cercariae dissected from infected snails' livers a 6th pair of glands was demonstrated anterior to the anterior cephalic glands which apparently correspond with the " escape glands " as described in certain other trematode genera. Their function is inferred to be to aid the cercariae in emerging from the snail.

Normally the cercariae penetrate the skin between the hairs, but they have been observed in hair follicles. Before entering the skin the cercaria attaches itself by the oral and ventral suckers. Then it releases the ventral sucker and in a vertical attitude begins to penetrate the skin. Penetration is accompanied by vibratory movement of the body or lashing movement of the tail, and results in the cercaria, usually having shaken off the tail, lying in a tunnel in the stratum corneum parallel to the skin surface. Entry is believed to be partly mechanical and partly by a secretion from the anterior cephalic glands and the tunnelling is due to a separation of the layers of the stratum corneum which is assisted by the secretion from the glands. The cercaria undergoes a resting stage in the tunnel, lasting from 4 minutes to 24 hours, before migrating to the deeper tissues. On rare occasions the cercaria, on entering the skin, may penetrate directly to the dermis without making a tunnel in the stratum corneum.

The cercaria lying in the tunnel still possesses the posterior cephalic glands but the anterior glands are not visible as their contents have been used up during the first phase of penetration. After penetrating to the deeper tissues—the second phase—the cercariae were seen by means of stained serial sections to have lost the posterior cephalic glands and their position and that of the anterior glands was occupied by tissue, the nuclei of which resembled those of the muscular system. In this second phase the cercariae are always tail-less, the tail having been left behind in the stratum corneum. Lytic zones were often observed around cercariae lying in the more superficial layers of the cutis vera, which are believed to be due to the secretion from the posterior cephalic glands.

Although the authors' observations were made on a rodent host it is considered that the process of penetration in a human host would not differ substantially, though possibly the duration of the resting phase may be more constant in the latter. They hold that their interpretation of the resting phase "may explain the generally accepted belief that, in the case of individuals exposed to schistosome cercariae, the subsequent application of alcohol to the skin, or even brisk rubbing with a towel, when applied shortly after exposure will lessen the risk of development of infection". *J. J. C. Buckley*

OLIVIER, L. & STIREWALT, M. A. **An Efficient Method for Exposure of Mice to Cercariae of** *Schistosoma mansoni*. *J. Parasitology*. 1952, Feb., v. 38, No. 1, 19–23, 2 figs.

A technique is described for the exposure of mice to cercariae of *S. mansoni*, which is claimed to be efficient, relatively safe and relatively fast. It consists of immobilizing a mouse on its back on a thin board with a hole through which the tail hangs down vertically when the board is horizontal. The tail is immersed in a Kahn tube, 75 × 12 mm. containing the cercarial suspension, which is set in a rack which also carries the mouse and its board in a suitable position. The rack accommodates a series of tubes and immobilized mice.

Two persons can expose 100 mice to known numbers of cercariae in 4 hours if the cercariae are measured into the tubes by aliquot from a stirred suspension of known concentration. The exposure period is usually from 30 to 60 minutes.

Among the other advantages claimed for this method are its safety; the mice cannot splash cercariae out of the container and as only a small area has been exposed, there is less risk of infection in handling the mice. The normal route of entry, the skin, is employed and the lack of hair on the tail facilitates the entry of cercariae, as compared with other immersion methods. Uniformity of infection was improved and larger numbers of worms came to maturity and every mouse became infected. Faeces and urine cannot enter the cercarial suspensions.

and the mice cannot lick the cercariae off the skin. The method has special advantages for certain kinds of experiments. *J. J. C. Buckley*

Moore, D. V. & Meleney, H. E. **Susceptibility of Rice Rats (*Oryzomys palustris*) to *Schistosoma mansoni*.** *J. Parasitology*. 1952, Feb., v. 38, No. 1, 76–9.

"Rice rats, *Oryzomys palustris palustris* and *O. palustris natator*, have been successfully infected with *S. mansoni*. Although the worm recovery was low the schistosomes reached maturity and viable eggs were passed in the feces of the infected animals."

Biaggi, N. **The Fight against Schistosomiasis.** *Puerto Rico J. Pub. Health & Trop. Med.* 1950, Dec., v. 26, No. 2, 101–9. [Spanish version 110–20.]

This is a general account of schistosomiasis in Porto Rico with special reference to the methods of control which have been employed there. The procedure adopted in February 1947 in one rural community where schistosomiasis is endemic was as follows: (*a*) treatment of all infected persons, (*b*) hygienic and medico-social instruction to all the inhabitants, (*c*) installation of sanitary latrines, (*d*) improvement of water supply, and (*e*) attempts at eradication of molluscs by biological means. By September 1949 the incidence fell from 44·6 per cent. to 4·5 per cent., primarily, it is thought, as a result of the treatment and education, though the installation of latrines was probably also effective. It is pointed out that this success in a limited population was due to a prolonged, concentrated and expensive campaign which could not be applied to the whole of the island.

The general principles involved in schistosomiasis control are outlined and anti-cercarial measures are considered in some detail together with the effects of sewage treatments on eggs and miracidia. Biological control of snail vectors is also mentioned but the author favours the use of chemical molluscicides and gives a brief account of field tests which were carried out in Porto Rico by various workers against *Australorbis glabrata* with 11 different chemicals. Sodium pentachlorophenate and copper pentachlorophenate are highly recommended for their efficiency and relatively low cost.

J. J. C. Buckley

Szumlewicz, Alina P. & Kemp, H. **Promising Molluscicides against a Brazilian Planorbid Snail.** *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, July, v. 3, No. 3, 407–22. [Portuguese version 389–406 (17 refs.).]

"1) Eight organic compounds, sodium salts of pentachlorophenol, trichlorophenol, mono and dichlorophenol and dinitro-o-cresol, phenyl-mercury-acetate, hexachlorocyclohexane and its gamma and delta isomers showed high molluscicidal efficiency. Concentrations of four p.p.m. of all these compounds were lethal to the local snail *Australorbis immunis* in laboratory tests.

"2) Results of two experiments with a species of *Australorbis* which is a proved intermediate host of human schistosomiasis in the Rio Doce Valley, were comparable with those obtained with *Australorbis immunis*.

"3) Sodium salts of pentachlorophenol and dinitro-o-cresol and phenyl-mercury-acetate killed all snails at a rate of one part per million.

"4) Under laboratory conditions, considered optimum for maximum toxic action, sodium salt of pentachlorophenol and phenyl mercury-acetate at a rate of ten p.p.m., killed all snails after a contact period of six hours.

"5) Experimental comparisons in the laboratory on the lethal action of copper sulphate and certain organic compounds under identical conditions upon the local snail, indicate that at least two organic substances are molluscicides superior to copper sulphate : sodium salt of pentachlorophenol and phenyl-mercury-acetate.

"6) All the compounds were toxic to fish *Phalloptychus januarios* at molluscicidal concentrations."

IZUMI, S. **Studies on Food Habit and Inhabitable Ground of** *Katayama nosophora* **Robson, the Intermediate Host for** *Schistosoma japonicum*. *Japanese Med. J.* 1951, Apr., v. 4, No. 2, 125–9. [10 refs.]

Laboratory experiments with *Oncomelania* (*Katayama*) *nosophora* showed that these snails were attracted to soft muddy ground, avoided soil to which a small quantity of lime or powdered ferrous rust had been added and did not survive more than 10 days in infusions of soils (1 gm. in 20 cc. distilled water) from Yamanski Prefecture and Tokyo suburbs.

Fifteen specimens of soil, taken from places well populated by the snails, were found to be rich in organic débris and their *p*H varied from 4·8 to 7·1.

Food preferences of snails were tested with various substances for two days, after which the contents of the digestive tracts were examined. Common greens, freshwater algae, agar and starch were consumed in abundance, and dried grasses and hay were also taken. Powdered silk-worm chrysalis was not favoured. Soil to which starch was added was consumed, but not much when mixed with peptone. *J. J. C. Buckley*

CHU, G. W. T. C. **First Report of the Presence of a Dermatitis-Producing Marine Larval Schistosome in Hawaii.** *Science*. 1952, Feb. 8, 151–3, 3 figs.

Forty specimens of the marine snail *Littorina pintado* Wood, collected from Moku Manu (" Bird Island ") near Kaneoha, Oahu, Hawaii, were found infected with a larval schistosome which has been identified tentatively as *Cercaria littorinalinae* Penner, 1950. Ten per cent. of the snails were infected. The infection rate in these snails with the same schistosome on another island, Manana, offshore from Oahu, was 0·5 per cent. The definitive hosts of this parasite are as yet unknown but sea birds are possible hosts. The Wyman western gull is known to harbour adult schistosomes but this bird is not found in the Hawaiian area.

" Swimmers itch ", known locally as " Pearl Harbour itch " has been often observed in sea bathers in certain parts of Pearl Harbour and Honolulu and more recently, elsewhere ; but the causal organism is unknown. Experimental itching, usually with visible dermatitis was produced with *C. littorinalinae* in 5 human volunteers by the present author. *J. J. C. Buckley*

KOMIYA, Y. & KONDO, S. *Anas domestica* **as a Definitive Host and** *Ophicephalus argus* **as a Second Intermediate Host of** *Clonorchis sinensis*. *Japanese Med. J.* 1951, June, v. 4, No. 3, 157–61. [17 refs.]

One out of 7 birds, *Anas domestica*, was found naturally infected with *Clonorchis sinensis*. There were " 17 pieces " [presumably specimens] in the gall bladder, which were abnormally small and thin, with poorly developed ovaries and less convoluted uteri. The testes were incompletely dendritic and in some were deformed and the vitellaria were almost lacking on one side.

Uterine eggs were poorly developed, usually irregular in shape and never contained a miracidium. Giving infected fish as food to 5 *Anas domestica* failed to produce infection in the birds.

While examining a number of *Ophicephalus argus* for parasites, the authors found one of them infected with more than "10 pieces" of encysted metacercariae of *C. sinensis* but their infectivity to a definitive host was not ascertained. Although apparently a rare intermediate host for *C. sinensis*, the authors emphasize that *O. argus* is an important transmitter of *Gnathostoma*, the causal organism of cutaneous gnathostomiasis in man, also known as Yangtze oedema and creeping disease. *J. J. C. Buckley*

ZAHRA, A. **Paragonimiasis in the Southern Cameroons : a Preliminary Report.** *West African Med. J.* 1952, Apr.–May–June, v. 1 (n.s.), No. 2, 75–82, 1 map & 2 figs. [13 refs.]

Paragonimiasis is usually regarded as a rare disease among the indigenous African population, but Dr. Zahra believes that it is by no means uncommon in the Southern Cameroons, and draws attention to the importance of remembering that this helminth infection, either by itself or in association with tuberculosis, may be a cause of chronic cough and haemoptysis. That this opinion is founded on substantial evidence is shown in the following table which is quoted from his paper.

	No. attending Unit	No. examined micro-scopically	Paragonimi-asis only	Tuberculo-sis only	Paragonimi-asis plus Tbc.
Nyassoso...	1,080	375	38 (3·51%)	17 (1·57%)	2 (0·18%)
Ngusi ...	280	97	11 (3·92%)	2 (0·71%)	—
Ndum ...	441	223	24 (5·44%)	12 (2·72%)	3 (0·68%)
Tombel ...	1,201	407	23 (1·91%)	2 (0·16%)	—

The author states that as one specimen of sputum only could usually be obtained from each suspected case, these figures are probably an underestimate of the true picture.

The majority of the *Paragonimus* infections occurred at puberty with a preponderence among females. Crabs and tadpoles, very incompletely cooked, form part of the diet, and the belief is current among the Bakossi people that crabs are a valuable aid to fertility. It is the practice in this Tribe for the men to eat the tadpoles and the women and children the crabs ; this may account in part for the sex and age distribution already mentioned.

No beneficial effects were observed to follow treatment with Fouadin (16 cases), Miracil D (one case) and Antrypol (one case). Although it appears reasonably certain that infection is acquired through eating improperly cooked crabs, caught in the fast running streams, the molluscan host and the life-cycle of the parasite in it are still unknown. *R. M. Gordon*

FIDALGO DÍAZ, M. A. Diagnóstico de la hidatidosis. [**Diagnosis of Hydatid Disease**] *Med. Colonial.* Madrid. 1952, July 1, v. 20, No. 1, 43–52.

READ, C. P. **Human Sparganosis in South Texas.** *J. Parasitology.* 1952, Feb., v. 38, No. 1, 29–31.

A tapeworm larva of the sparganum type, measuring 7·5 cm. long by 0·05 cm. in diameter, was found in a nodule removed from the breast of a woman in

South Texas. The nodule measured 3×2×1·5 cm., was surrounded by fat and was not encapsulated. The parasite was surrounded by an inflammatory infiltration with numerous eosinophiles in some areas. Blood examination showed an eosinophilia of 9 per cent. In the same patient a month later a second nodule occurred in the left thigh, identical with the first and apparently caused by the same kind of parasite. No evidence of the source of the infection could be obtained but it is presumed that it is related to the presence of *Spirometra mansonioides* in feral domestic cats and wild cats reported in this area. This is the second case of human sparganosis in South Texas [see this *Bulletin*, 1915, v. 6, 301]. *J. J. C. Buckley*

Ciauri, G. Sulla sindrome pseudo-ulcerosa della anchilostomiasi. [**The Pseudo-Ulcerous Syndrome in Ankylostomiasis**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1952, Mar., v. 33, No. 3, 161–74, 2 figs. [32 refs.] English summary (8 lines).

A general discussion and account of a case.

Jawad, H. **Four Cases of Trichostrongyliasis in Iraq.** *J. Faculty of Med., Baghdad, Iraq.* 1952, v. 16, No. 2, 68.

Fueki, K. **On the Modes of *Ascaris* Infection in Japan.** *Keio J. Med.* Tokyo. 1952, Jan., v. 1, No. 1, 21–34, 4 figs. [15 refs.]

The object of the investigations described was to evaluate quantitatively the significance of the presence of the eggs of *Ascaris lumbricoides* on vegetables and in other possible media of transmission, such as soil, dust, puddles of water, flies and fingers.

Eggs were recovered by a floatation method from standard soil samples taken from different corn and vegetable fields, counted and examined for viability and stage of development. Of 130 soil samples, of which 1 gm. of each had been taken for egg-counting, 66 (51 per cent.) were positive. The total egg count was 359, of which 132 (36·8 per cent.) were embryonated eggs. The percentage of embryonated eggs during July–October varied from about 70 to 80, and fell to 11·4 per cent. in November when night-soil was being used in abundance and the proportion of early developmental stages was greater. The average number of eggs per gm. of soil was 2·8 and that of embryonated eggs 1·0. The maximum number found in 1 gm. was 16.

Laboratory dust examined by the same procedure showed 51 per cent. of specimens positive from the parasitology laboratory and 8 per cent. in the hygiene laboratory; 2 per cent. of specimens from floors of electric cars were positive. Japanese mats, which are much used in Japanese homes, were also examined and 23 per cent. of dust specimens from these were found positive.

In early spring (March and April) strong winds blow when the ground is very dry and much dust is blown into houses and is visible as a thin layer on tables, shelves, etc. Specimens of this dust examined in the normal way showed eggs in 63 per cent. of 100 samples, each of 1 gm., the total number of eggs being 21 or 44 per cent. of the number contained in an equal amount of soil of the fields; 58 of the eggs were embryonated and it is argued from this that infective eggs are present in the environment throughout the year, since no development of eggs takes place during the cold months of November to March.

In sediment from puddle water and flood water from fields the number of eggs found corresponded closely to the number found in field soil. Flies caught in the laboratory were examined, and one *Ascaris* egg was found on 150 flies.

The finger tips of 279 children in a mountain village near Tokyo were examined by wiping with a gauze swab and 17 (6·1 per cent.) were positive. Nail pairings from 213 children revealed eggs in 23 (10·8 per cent.).

Vegetables of 20 different kinds were collected from greengrocers, farmers and from home vegetable gardens, and were examined throughout the year. Of 2,750 examined, *Ascaris* eggs were found on 42·8 per cent., and 23·1 per cent. of the eggs were infective. Leafy vegetables were the most contaminated, root vegetables less so and fruit vegetables (egg-plant, tomato, cucumber, grape) rarely. The percentage of infective eggs was highest in the summer (58·3 per cent. in August) when the development is more rapid owing to the higher temperature, but human infection is not at a peak in this season as leafy vegetables are not marketed in summer. It is concluded that human infection occurs most frequently in spring and autumn when the climate is favourable for the development of the eggs and certain highly contaminated kinds of vegetables, which are eaten uncooked, are being marketed. *J. J. C. Buckley*

Akimoto, T.; Hashimoto, T.; Kubo, S.; Fukushima, T.; Yasuda, M.; Maruyama, M.; Tsuruta, K.; Sato, K.; Atsumi, T.; Asakura, S.; Narumi, H. **The Relation between the Parasitization of** *Ascaris lumbricoides* **and Abdominal Pain in Villages of the Hirosaki District. (Report 1.) The Results of Mass Examination of Eggs in Feces** [Akimoto, Hashimoto & Kubo]. **(Report 2.) Vomiting and Excretion of the** *Ascaris lumbricoides* [Akimoto, Fukushima, Yasuda, Maruyama & Tsuruta]. **(Report 3.) Studies of the Patients complaining of Abdominal Pain** [Akimoto, Sato, Atsumi & Asakura]. **(Report 4.) Studies on Patients complaining of Epigastrial Colicky Pain** [Akimoto & Narumi]. *Hirosaki Med. J.* 1952, Mar. 31, v. 3, No. 1. [English Abstracts *2, *3, *4, *19. Fuller papers in Japanese 3–6, 7–10 (10 refs.), 11–13, 73–5.]

Maki, T. & Hirakawa, Y. **Ascariasis of the Liver.** [Abstract.] *Hirosaki Med. J.* 1950, June 1, v. 1, No. 2, 2. [Fuller paper in Japanese 13–17, 3 figs. (20 refs.)]

An account of 2 cases.

Ouchi, K. & Kakizaki, C. **Ascaris-Eggs in Liver.** [Abstract.] *Hirosaki Med. J.* 1951, Sept. 10, v. 2, No. 2, 18. [Fuller paper in Japanese 111–14, 4 figs. (15 refs.)]

An account of 2 cases.

Jaskoski, B. J. **The Protein Coat in Development of** *Ascaris lumbricoides* **Eggs.** *Exper. Parasit.* New York. 1952, June, v. 1, No. 3, 291–302, 2 figs. [18 refs.]

Manson-Bahr, P. & Muggleton, W. J. **Further Research on Filariasis in Fiji. (A Study of Host-Parasite Relationships, with special reference to the Status of the Pacific Filaria** *Wuchereria pacifica*.) With an addendum by J. J. C. Buckley. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, May, v. 46, No. 3, 301–26, 3 graphs, 1 map & 15 figs. [98 refs.]

In 1912, the senior author published a memoir (*Res. Mem. Lond. Sch. Trop. Med.*, v. 1, Memoir No. 1) in which he incorporated the results of two years of research on filariasis in the Fijian Islands. In this account which, together with those of O'Connor [this *Bulletin*, 1923, v. 20, 891] and that of Buxton [*ibid.*, 1929, v. 26, 436] ranks as one of three great classcal studies of filariasis in the Pacific, he recorded his opinion that the non-periodic filariasis of these islands might constitute a separate variety, or even species, distinct from *Wuchereria bancrofti* of the nocturnal periodic type. In June, 1950, Manson-Bahr re-visited

the scene of his early labours and as a result of four months of intensive study he acquired further knowledge which has shed fresh light on a problem first tackled by him some forty years previously.

In the present paper the authors describe the results of their recent investigations and review relevant literature which has accumulated between the dates of the two publications. As a result of their own and other workers' observations they reach the conclusion that the evidence now available greatly strengthens their original contention that the non-periodic Pacific variety of *W. bancrofti* should be regarded as representing a distinct species, separate in the physiological and biological senses. Among the various facts advanced in support of this opinion, the following appear particularly worthy of attention. Previous observers have recorded that the inhabitants of Ocean Island were fairly heavily infected with filariasis exclusively of the nocturnal type, that they were singularly free from symptoms of the disease, and that whereas *Culex fatigans* and *Aëdes aegypti* bred in large numbers, members of the *Aëdes scutellaris* group, the vectors of non-periodic filariasis in the Fijian Islands, were absent. In December, 1945, the entire population of 920 persons were evacuated from Ocean Island and transferred to the island of Rambi, where the mosquitoes are, in order of density, *C. fatigans*, *Aëdes vexans*, *Aëdes aegypti* and *Aëdes scutellaris polynesiensis*. When examined in 1950 it was found that this transferred community had retained " this small island of nocturnal periodicity in a surrounding sea of non-periodic filariasis for over 4 years ". When a Fijian strain of *C. fatigans* was fed on members of the community with microfilariae in their peripheral blood a high proportion of the ingested larvae developed to the infective stage, whereas it was shown that this species was to a large extent refractory to the development of the non-periodic microfilariae. " In contrast to this experience : the island of Kioa (about a quarter the size of Rambi) lies some 7 miles away in a southerly direction. There is only one isolated village inhabited by some 200 Ellice Islanders who had been transported there from Vaitupu 2 years before. Since that time they have remained isolated. A considerable number are infected with filariasis which was sufficiently evident in a cursory inspection, and a number of subjects of elephantiasis had been evacuated to the mainland. Out of 51 examined, the microfilaria rate was 32·2 per cent. The blood in measured amounts was examined twice daily at 10 a.m. and 10 p.m. ; in every case the number of microfilariae was approximately equal. Therefore in this community, as might be expected, the filaria is of the non-periodic type. *A. s. polynesiensis* (?) abounded in the village."

The authors then describe in detail experiments the results of which clearly established that *Aëdes scutellaris pseudoscutellaris* and *Aëdes scutellaris polynesiensis* are optimum hosts for the development to the infective form of the non-periodic microfilariae of *Wuchereria*.

Evidence is brought forward to support the view that the non-periodic type of Wuchererian filariasis is more often associated with severe clinical manifestations than is the periodic type. The authors are of the opinion, however, that this difference is due to the total number of adult filariae in the body rather than to the variety of the parasite to which they belong. In contrast to the effect of heavy adult infestation, the number of microfilariae in the peripheral blood is not necessarily an index of the severity of the disease, " in general terms it may be stated that the more numerous the microfilariae in the peripheral blood the less evidence there is of any lymphatic obstruction and therefore of any pathological effects ".

As regards the morphological differentiation of the proposed species ; Buckley, in an *addendum*, describes the results of comparing 6 male and 6

female *Wuchereria* worms of the non-periodic type which had been collected in Fiji with 16 female and 15 male worms of the periodic type collected in British Guiana, the Belgian Congo, the Philippines and Australia. Significant differences in length between the females of each group and the males of each group were noted. " It must be borne in mind, however, that there is no certainty that the six non-periodic females, although sexually mature, were fully grown ; though the probability that they are all undersized is reduced by the fact that the six specimens were recovered from five different human subjects. The six non-periodic males were recovered from four different human subjects." Certain very slight differences in the shape of the tail and the form of the mouth opening in the two groups were also observed, but here again the differences were too small to be considered reliable unless future examination of a much larger number of specimens shows them to be constant.

[This valuable paper does not lend itself to further summarization, and the reviewer has had to omit reference to many interesting facts and some stimulating theories mentioned by the authors. It should be read in the original by those interested.] *R. M. Gordon*

CANET, J. Nouvelles recherches sur la répartition de la filariose humaine dans le Sud de l'Indochine (1950–1951). [**New Studies of the Distribution of Human Filariasis in South Indo-China**] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, Nos. 1, 2 & 3, 286–310, 1 map. [27 refs.]

A second series of researches was undertaken in 1950 and 1951 on the distribution of filariasis in S. Indo-China extending in the S.E. to Cambodia, to lower Cochin-China and to the plateaux of S. Annam which adjoin it in the East. [For the first series, see this *Bulletin*, 1951, v. 48, 58.]

A total of 2,422 persons (1,894 adults and 528 children) was examined, including Moïs, Cambodians and Cochin-Chinese.

Filariasis is widespread in Cochin-China ; but it is particularly so in the mountaineers of the Moïs who inhabit the high plateaux of the Annamite range. With the exception of a number of small foci disseminated in the alluvial plains of the South, filariasis affects the Moïs, who are of Malayo-Polynesian origin, and who live at an altitude of 80–1,000 m. This filariasis from East to West is confined to the mountain ridges.

In addition there are non-autochthonous foci which exist among Tonkingese in pineapple plantations. In the North and in the South there are several very heavily infected spots in which it is difficult to determine whether the filariasis is autochthonous or not.

There is also paradoxical distribution where in the same sector there are some very intensely infected spots in proximity to villages which have been entirely spared by the disease. Another point is the *rarity of filariasis* in children, who are hardly ever infected below 10–12 years and *never* below 3 years, even in the most heavily parasitized areas (inhabited by the race known as Stiengs).

In general terms the filaria-infection rate is higher in men than in women. This is the general rule, but it is not absolute. Especially in the Stiengs, it is related to their mode of life. Only small children and the aged stay permanently in their huts.

Another point is the rarity of clinical manifestations of filariasis among the Moïs. Apart from a few manifestations of lymphangitis and transitory chyluria, only one single case of lymph-scrotum with microfilaraemia came to light. On the other hand, clinical filariasis is most frequent in the Vietnamese. In members of this group from the South genito-urinary manifestations are usually found.

Only one species of filaria (*W. bancrofti*) was found, but though the periodicity was strictly nocturnal in the Cochin-Chinese, it was not so among the Stiengs, in whom considerable numbers of microfilariae persisted during the morning and early afternoon.

Six per cent. of *C. fatigans* taken in the vicinity of Honquan contained larval forms of *W. bancrofti*. Probably the indigenous Malayo-Polynesian population have carried with them the parasite in their wanderings through Indo-China, which may account for these anomalies in distribution. On the other hand there may exist a reservoir, as yet unknown, in the forests of the plateaux.

No evidence was obtained of the existence of *W. malayi* in Cochin-China.

The results are shown in great detail in several tables.

Philip Manson-Bahr

ROW, P. **Chyluria.** *Med. J. Australia.* 1952, June 21, v. 1, No. 25, 847–9.

"1. Chyluria is not a rare disease in Queensland.

"2. Though it is believed to be a late complication of filariasis it is unusual to find evidence of active filaria infestation in patients suffering from chyluria.

"3. Chyle is discharged into the upper urinary tract much more commonly than into the bladder.

"4. It is possible to relieve the symptoms of chyluria rapidly by filling the renal pelvis with sclerosing solution."

RODHAIN, J. Les adénolymphocèles du Congo Belge. [**Varicose Groin Glands in the Belgian Congo**] *Anais Inst. Med. Trop.* Lisbon. 1951, Sept., v. 8, No. 3, 503–15, 14 figs. on 7 pls. [15 refs.]

The author had at his disposal, and as the basis for the present paper, excised varicose groin glands from various parts of the Belgian Congo :—

(1) Localities, such as Kwango and Bagata where *Wuchereria bancrofti* is found alone ;

(2) L'Uelé and high Ituri where *Onchocerca volvulus* occurs ;

(3) Yahuma (Basoko) where *W. bancrofti* co-exists with *O. volvulus*.

(1) The specimens in the first area were derived mostly from women presenting typical appearances in the groin, and in one in particular, a fairly firm mass to the right of the umbilicus. Lymph puncture revealed numerous microfilariae (*bancrofti*).

No adult or embryo filariae were, however, seen in sections of the groin glands, but masses of central lymphoid tissue with surrounding dilated peripheral lymphatics. In general the pathological picture of these glands is one of partial sclerosis intermingled with dilated lymph channels.

(2) In this region a tumour measuring 15 cm. × 7 cm. consisted of 7 lymphatic glands. On section there was a peculiar type of diffuse sclerosis and fragments of *volvulus* microfilariae were demonstrated in the connective tissues. In other instances the central sclerosis varied in different glands of the same tumour mass. The surrounding tissues were rich in blood vessels and thickened lymphatics. Microfilariae were numerous in the connective tissues as well as in the gland substance. Eosinophilic infiltration was extensive.

(3) In these mixed infections ganglionic masses were of a considerable size (5 cm. × 5 cm.) and the lymph glands were hard and firm. Microfilariae (*volvulus*) were numerous in skin sections and in the gland substance. In other glands with central sclerosis sections of adult *W. bancrofti* were secured, but no microfilariae could be demonstrated in sections.

Histological structure corresponded with that usually described for *W. bancrofti*. On this basis the evolution of various groin glands due to *O. volvulus* infections can best be explained, but it is not so easy to account for the somewhat similar sclerosis to uncomplicated cases. As *O. volvulus* embryos can be demonstrated in the gland parenchyma it is suggested that they may cause the fibrosis. This, however, raises a difficult question, because they can also be demonstrated in those glands which have undergone little, if any, hypertrophy. A localized associated elephantoid condition of the skin was also frequently observed, in which microfilariae (*volvulus*) were common.

On the whole the author considers that lymphoid reactions may be anaphylactic in nature, that some individuals are more susceptible than others and that the anatomical arrangement and course of the lymphatic vessels in the groin renders this region more prone to develop varicose groin glands. The question arises why similar varicose groin glands are not met in Central and South America where *O. volvulus* is common. It probably depends on the localization of the adult worms. The paper is illustrated by 14 photographs.

Philip Manson-Bahr

Pfister, R. Note sur la présence en Haute-Volta (A.O.F.) de *Microfilaria* (= *Dipetalonema*) *streptocerca* (Macfie et Corson, 1922). [**Presence of *Dipetalonema streptocerca* in the Upper Volta Region, French West Africa**] *Méd. Trop.* Marseilles. 1951, Nov.-Dec., v. 11, No. 6, 935–8. [13 refs.]

The microfilariae of *Dipetalonema streptocerca* were found in skin scarifications from 4 Africans of 867 examined (0·4 per cent.) in the Upper Volta region of French West Africa. This is the first time this infection has been recorded in French West Africa and it is believed that all 4 cases are autochthonous. The microfilariae are redescribed and principal measurements are given of 5 specimens taken from the 4 positive cases. Microfilariae of *O. volvulus* were found in 21 of the 867 examined (2·4 per cent.) and thick blood smears taken during the day showed 16, or 1·8 per cent. with microfilariae of *W. bancrofti* and 160 or 18·4 per cent. with those of *D. perstans*. *J. J. C. Buckley*

Pfister, R. Répartition et fréquence des filarioses en Haute-Volta et en particulier dans la région de Bobo-Dioulasso. [**Distribution and Frequency of Filariasis in Haute-Volta, particularly round Bobo-Dioulasso**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 92–102, 1 fig. & 1 chart.

A microfilarial survey was carried out in the Black Volta valley and in the northern and western regions with special reference to Bobo-Dioulasso. Of 5,232 persons examined from 54 villages in the region north and west of Bobo-Dioulasso, microfilariae of *D. perstans* were found in 67 per cent. of the men, 58 per cent. of the women, 25 per cent. of boys under 15 years old, and 20 per cent. of girls under 15 years old. There is an increase in the incidence with age, the old people being nearly 100 per cent. infected. It is shown that the incidence in different regions corresponds with latitude and rainfall; the higher the rainfall the higher the incidence.

Infections with *O. volvulus* were diagnosed mainly by finding nodules, but in one group microfilariae were also searched for in the skin. Nodules were found in 3 per cent. of over 30,000 examined. In men there were 5·7 per cent. of 9,725 examined, in women 2·8 per cent. of 9,946 and in children 0·8 per cent. of 11,505. The average infection rate in 3 countries traversed by the Black Volta River or its tributaries was 10 per cent. Of 432 adults examined for microfilariae in the skin, 44 were positive and only 22 of the latter had nodular lesions.

Blood smears, taken during the day, were examined for microfilariae of *W. bancrofti* and 3 per cent. of 1,440 were positive. As for *D. perstans* and *O. volvulus*, the incidence of this infection increases as the regional rainfall increases. No clinical manifestations were observed. Four cases of infection with *D. streptocerca* were found. [These have been noted in a previous abstract, above (1952) p. 1065.] *J. J. C. Buckley*

SARKIES, J. W. R. **Antrypol in the Treatment of Onchocerciasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, July, v. 46, No. 4, 435–6.

Reports of Antrypol (or Suramin) in the treatment of onchocerciasis have already appeared [this *Bulletin*, 1948, v. 45, 456 ; 1949, v. 46, 855 ; 1950, v. 47, 389]. The present author, in an endemic area in the Gold Coast, treated 13 schoolchildren having microfilariae in the anterior chamber of the eye with total dosage of 37–170 mgm./kgm. body weight of Antrypol : this was given as weekly intravenous injections of 0·5 or 1·0 gm. The author has already reported early results (*Brit. J. Ophthalmology*, 1951, v. 36, 81) but now records the results after the 10-month period September 1950-November 1951, and these are shown in a table.

All 13 children had microfilariae of *O. volvulus* in skin smears and in the anterior chamber and showed presbydermia and nummular opacity (except 1 in the last mentioned). In November 1951, after treatment, no microfilariae were found in the skin or eyes, and the opacities and presbydermia had disappeared, except that in one child (who had received a much smaller dose) there was slight residual presbydermia and another had a single nummular opacity of the cornea.

Six children also had small doses of hetrazan, but there was no final difference between them and those having Antrypol alone.

Fourteen untreated children with microfilariae in skin smears, but without ocular involvement, showed no spontaneous improvement, and in 5 of them microfilariae actually appeared in the anterior chamber during the 10-months period of observation. *H. J. O'D. Burke-Gaffney*

MASTRANDREA, G. Considerazioni sull'impiego terapeutico della fenotiazina e risultati ottenuti nel trattamento di alcune elmintiasi. [**Therapeutic Use of Phenothiazine and Results in Some Helminthic Diseases**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1952, Mar., v. 33, No. 3, 138–50. [49 refs.]

The English summary appended to the paper is as follows :—

"The author discusses the therapeutic use of phenothiazine and the results thus obtained. In his practice the author achieved considerable results with the use of phenothiazine in the treatment of oxyuriasis : symptoms disappeared and tests were negative in 86% of cases.

"The treatment of ascariasis with phenothiazine was not successful. No toxic effects were noted."

CHAN, Kam-fai. **Life Cycle Studies on the Nematode** *Syphacia obvelata*. *Amer. J. Hyg.* 1952, July, v. 56, No. 1, 14–21, 5 figs. [14 refs.]

"1. A technique for embryonating eggs of *Syphacia obvelata* is described. Incubation experiments with eggs from worms secured from different parts of the host's intestine are described.

"2. The developmental stages in the life cycle of *Syphacia obvelata* have been studied and the different modes of infection investigated. The life cycle

and habitat of *S. obvelata* and *Enterobius vermicularis* are probably very similar. These findings should lead to a more rational approach to chemotherapeutic studies."

CHAN, Kam-fai. **Chemotherapeutic Studies on *Syphacia obvelata* Infection in Mice.** *Amer. J. Hyg.* 1952, July, v. 56, No. 1, 22–30. [13 refs.]

"A method for employing *Syphacia obvelata* infection in mice for chemotherapeutic testing is described.

"The activities of various standard anthelmintics, antibiotics and sulfonamides in *Syphacia obvelata* in mice have been studied. Combinations of bacitracin and sulfaguanidine, and bacitracin and sulfasuxidine showed a marked synergistic action against *Syphacia*. Their clinical value in man remains to be determined."

GREENE, R. A. & BREAZEALE, E. L. **The Incidence of *Trichinella spiralis* Infections in an Asymptomatic Group, as indicated by the Kline Test.** *Arizona Med.* 1951, May, v. 8, No. 5, 36–7.

"One thousand (1000) sera which had been submitted for various laboratory tests were examined by the Kline slide test for trichinosis. Trichinosis was not suspected in any case. Ten (10) per cent of the sera (100) gave positive Kline tests and 3·2 per cent (32) gave doubtful reactions. These results indicate that, in spite of the relatively few cases of trichinosis reported in Arizona, the incidence of infection with *Trichinella spiralis* is at least as great in Arizona as in other parts of the United States."

VON BRAND, T., WEINSTEIN, P. P., MEHLMAN, B. & WEINBACH, E. C. **Observations on the Metabolism of Bacteria-Free Larvae of *Trichinella spiralis*.** *Exper. Parasit.* New York. 1952, June, v. 1, No. 3, 245–55, 2 figs. [18 refs.]

"1. The larvae of *Trichinella spiralis* consume aerobically and anaerobically about the same amount of glycogen, while lipid consumption occurs only under aerobic conditions.

"2. The major endproducts of the carbohydrate fermentation are volatile fatty acids, especially valeric acid, while only traces of lactic acid are produced. Keto substances in small amounts are produced only in the presence of oxygen. Part of the acids is excreted as free acids, while another part may be excreted in the form of ammonium salts.

"3. Carbohydrate fermentation is the process which allows the larvae to survive anaerobic processes, but it is insufficient to allow motility. It is probable that a major part of the oxygen consumed is used for the oxidation of lipids and this process may be of importance for the motility of the larvae."

DEFICIENCY DISEASES

CARLILE, J. P., DUFF, W. R. & MACGREGOR, R. G. S. **Blood Pressure in Chronically Undernourished Europeans in the Tropics.** *J. Trop. Med. & Hyg.* 1952, June, v. 55, No. 6, 121–8, 3 figs. [12 refs.]

Blood pressure readings were taken regularly on a group of 150 Europeans living in internment camps at Singapore between 1942 and 1945. Ages ranged from 25 to 60 years. During the period all the subjects lost weight, many up to 40 per cent. of their original weight on internment. In the great majority of persons both systolic and diastolic pressure remained substantially unchanged throughout the period. Two men, however, showed significant sustained rises in both diastolic and systolic pressure despite the low calorie intake. Each of these men had systolic pressures over 120 mm. Hg when first taken in the camp. The results are shown in 3 figures and 4 tables. *R. Passmore*

SOUTH PACIFIC COMMISSION. **Researches on Nutrition and Alimentation. Report on Research conducted in New Hebrides during 1951,** by S. MALCOLM. Noumea, New Caledonia. Research Projects H.2–H.5, Reports Nos. 6–7. 1952, Apr. 51 mimeographed pp., 6 graphs & 1 map.

JACKSON, J. H. **Malnutrition in the Native in the Transkei.** *South African Med. J.* 1952, June 21, v. 26, No. 25, 501–4. [11 refs.]

"The total problem of malnutrition is beyond solution in the surgery, and has now reached a State problem of such a magnitude that its solution will require from the peoples of South Africa a completely non-political effort. There is no answer to it except by methods which will raise the economic and educational standards of the Native peoples. The malnutrition exhibited is but a link in a vicious circle."

This is the theme of the paper, which the author's experiences, in medical practice among the natives of Africa, enable him to elaborate in a stimulating fashion. *R. Passmore*

BERGOUNIOU, J. L. & TRÉMOLIÈRES, J. Contribution à l'étude de la dégénérescence graisseuse du foie chez le jeune enfant noir (kwashiorkor). [**A Contribution to the Study of Fatty Degeneration of the Liver in the Young Negro Infant (Kwashiorkor)**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 2, 242–60. [103 refs.]

This is a continuation of a review [see this *Bulletin*, 1952, v. 49, 793] of kwashiorkor as seen in French West Africa. It deals first with the relationship between kwashiorkor in infancy and cirrhosis of the liver in adults and secondly with cirrhosis of the liver and primary liver cancers. It is concluded that a benign form of kwashiorkor in infancy leads in many cases to cirrhosis of the liver in adults. The great majority of primary liver cancers, which are so common in Africa, can be attributed to dietary deficiencies, beginning at the time of weaning.

There is an excellent bibliography with many references to French literature. *R. Passmore*

GRIFFITH, R. L. **Condition of the Heart following Beriberi and Malnutrition.** *Arch. Intern. Med.* 1952, May, v. 89, No. 5, 743–58, 2 figs. [Refs. in footnotes.]

The condition of the heart was evaluated in 109 men who had suffered from severe malnutrition and beriberi in Japanese prisoner-of-war camps. The

men were seen between 1945 and 1951 and their ages ranged from 25 to 69. All but nine (8·3 per cent.) of the men presented evidence of a normal healthy cardiovascular system. Of the 9 cases of cardiovascular disease all could be accounted for on a basis other than beriberi.

Conditions such as oedema, cardiac enlargement, low amplitude QRS complexes, prolonged Q-T interval and flattened T waves, common in acute beriberi, did not persist after return to the usual American dietary.

Full details are shown in a table. *R. Passmore*

ARAKAWA, T. & TACHIBANA, K. **Studies on the Nutrition of Children in the Hirosaki Area (Report II). Blood Sugar Curve and Urinary Indigo-Red Reaction in Secondary Pellagra.** [Abstract.] *Hirosaki Med. J.* 1950, June 1, v. 1, No. 2, 11. [Fuller paper in Japanese 56–60.]

ARAKAWA, T. & TACHIBANA, K. **Studies on the Nutrition of Children in the Hirosaki Area (Report III). Urinary Indigo-Red Reaction and Angular Stomatitis in School Children.** [Abstract.] *Hirosaki Med. J.* 1950, Dec. 25, v. 1, No. 3, 7. [Fuller paper in Japanese 39–40.]

ARAKAWA, T., TACHIBANA, K. & OGASAWARA, F. **Studies on the Nutrition of Children in the Hirosaki Area (Report 5). Incidence of Angular Stomatitis in Children and Intelligence Test.** [Abstract.] *Hirosaki Med. J.* 1951, Mar. 31, v. 2, No. 1, 13. [Fuller paper in Japanese 63–6.]

ARAKAWA, T., TACHIBANA, K. & YOSHIDA, H. **Studies on the Nutrition of Children in the Hirosaki Area (Report VI). Angular Stomatitis of Mothers with or without Lactation and Urinary Indigo-Red Reaction.** [Abstract.] *Hirosaki Med. J.* 1950, Dec. 25, v. 1, No. 3, 8. [Fuller paper in Japanese 41–2.]

HAEMATOLOGY

FOY, H., KONDI, Athena, HARGREAVES, A. & LOWRY, J. **Response of Megaloblastic Anaemia in Africans to Oral Crystalline Penicillin G.** *Lancet.* 1952, June 21, 1221–5, 4 figs. [25 refs.]

Four Africans suffering from megaloblastic anaemia were treated with crystalline penicillin G by mouth. Two were given small doses of 200,000 units daily and two were given large doses of 400,000–600,000 units daily. The first two responded with reticulocytosis and eventual cure of the anaemia. Those who were given large doses did not respond to penicillin treatment but were cured subsequently when given vitamin B_{12} in one case and anahaemin in the other. In all cases diseases other than megaloblastic anaemia which might respond to penicillin treatment had been excluded and the authors assume that penicillin when effective altered the intestinal flora from one which did not synthesize essential haemopoietic substances into one which did. One of the two patients who did not respond had a normal to high gastric acidity, whereas the other 3 were hypochlorhydric, but this patient also did not improve when intramuscular penicillin was given, so the failure cannot have been due to destruction of penicillin in the stomach. The authors suggest that in the two cases in which larger doses of penicillin were given both the florae—antagonistic and beneficial to the production of haemopoietic substances—were interfered with.

The presentation of the experimental data is followed by an extensive discussion containing a variety of stimulating suggestions, one of them being that the high-carbohydrate/low-protein intake found in the Balkans, India and Africa may alter the bacterial flora in such a way as to cause a failure of production of haemopoietic substances, thus causing megaloblastic anaemia of "nutritional origin". *H. Lehmann*

MOONEY, F. S. **The Diagnosis of Carriers of Cooley's Anaemia.** *J. Clin. Path.* 1952, May, v. 5, No. 2, 154–60, 4 figs. [24 refs.]

The author points out that the hereditary or familial nature of Cooley's anaemia has become widely accepted, but that there is much difference of opinion regarding the best way to detect the latent form. In an effort to find the characteristics of this latent form of the disease, he examined 13 healthy relatives of a Maltese patient who had Cooley's anaemia. The genealogical tree is given. Haematological investigations carried out in addition to the estimation of the haemoglobin, red blood count and usual indices included the quantitative fragility test, construction of Price-Jones curves and observations on target and stipple cells.

It was found that the most consistently recurring abnormality in the blood picture of the healthy relatives was an increased stipple cell count and quantitative saline resistance. Both these, the author states, have also been found to be raised in all severe cases of Cooley's anaemia whenever they have been estimated. It is therefore deduced that as these findings are rare in other types of anaemia their presence in many relatives of patients with Cooley's anaemia is evidence of a carrier state in these persons.

Other indices did not reveal constant abnormalities, though the erythrocytes in the relatives were usually broad and thin and their volume low. Mild anisocytosis was also usually present. [In view of LARSEN's demonstration of erythrocytes of this type in liver disease and their known occurrence in anaemia of pregnancy associated with liver disease, it would be of interest to know whether similar hepatic damage is present in patients with Cooley's anaemia.] *A. W. Woodruff*

TEBBUTT, A. H. **Mediterranean Anaemia : Report of Three Cases.** *Med. J. Australia.* 1952, June 28, v. 1, No. 26, 885–6.

"Three cases of Mediterranean anaemia in its milder, probably heterozygous, form are briefly reported."

[See also this *Bulletin*, 1950, v. 47, 655.]

WASSERMAN, C. F., PHELPS, V. R. & HERTZOG, A. J. **Chronic Hemolytic Anemia in a White Child due to Thalassemia and Sicklemia. With a Genealogic Survey.** *Pediatrics.* Springfield, Ill. 1952, Mar., v. 9, No. 3, 286–9, 1 fig. & 1 chart.

"The authors have described the second case in the United States of chronic hemolytic anemia resulting from the genetic factors for sicklemia and thalassemia minor in combination. A complete hematologic study of 37 relatives of the propositus is presented. The four possible theories, as proposed by earlier investigators, which may explain the severe clinical manifestations, are given."

Frumin, A. M., Waldman, S. & Morris, P. **Exogenous Hemochromatosis in Mediterranean Anemia.** *Pediatrics.* Springfield, Ill. 1952, Mar., v. 9, No. 3, 290–94. [12 refs.]

"A patient with Mediterranean anemia who received many blood transfusions over a period of years is presented.

"The pigment deposition in Mediterranean anemia, originally thought due to an inherited defect, is attributed to multiple blood transfusions.

"It is maintained that this abnormal pigment deposition represents another instance of exogenous hemochromatosis."

Joselevich, M., Kleimans, M. & Zwaig, G. Cardiopatía anémica grave en un adulto con anemia de Cooley. [**Severe Cardiopathy in an Adult with Cooley's Anaemia**] *Semana Méd.* 1952, July 3, v. 101, No. 1, 11–19, 5 figs. [23 refs.]

VENOMS AND ANTIVENENES

Slotta, K. & Primosigh, J. Estudos químicos sobre os venenos ofídicos. 6. Composição da Crotoxina. [**Chemical Studies of the Ophidian Venoms. 6. Crotoxin Composition**] *Mem. Inst. Butantan.* 1950–51, v. 23, 51–61, 4 figs. [17 refs.]

The English summary appended to the paper is as follows :—

"The presence of at least 14 amino-acids in the acidic hydrolizate of crystalline crotoxin has been demonstrated by two-dimensional partition chromatography on paper. Also it has been possible to prove by one-dimensional chromatography, using special techniques, that crotoxin contains valine, histidine, leucine and isoleucine, whereas hydroxyproline is absent.

"It can now be asserted that crystalline crotoxin is composed of the following 18 amino-acids : arginine, histidine, lysine, aspartic and glutamic acids, phenylalanine, trytophan, tyrosine, glycine, alanine, valine, leucine, isoleucine, proline, serine, threonine, cystine, methionine."

Amorim, M. de F., de Mello, R. F. & Saliba, F. Envenenamento botrópico e crotálico. Contribuição para o estudo experimental comparado das lesões. [**Bothropic and Crotalic Poisoning. Contribution to the Comparative Experimental Study of the Lesions**] *Mem. Inst. Butantan.* 1950–51, v. 23, 63–107, 23 figs. (4 coloured) on 13 pls. [25 refs.] English summary.

Little has been published on the pathological anatomy of snake-poisoning and still less on its histopathology. The authors, after referring to the work of Mitchell between 1860 and 1886, of Pearce on the venom of *Crotalus adamanteus* in 1909 [the abstracter had the privilege of discussing this work with Dr. Pearce some 30 years ago], of Taube and Essex in 1937 [this *Bulletin*, 1938, v. 35, 432], and Fidler *et al.* in 1940 [*ibid.*, 1941, v. 38, 166], all with *Crotalus* venom, some of whom recorded renal lesions, others cerebral, now report their own experiments with dried venom of *Bothrops jararaca*, MLD 136 microgrammes intravenously for pigeons of 250–320 gm. weight, and of *Crotalus terrificus terrificus* MLD 1–2 microgrammes. The venoms were dissolved in physiological saline for injection.

Eight rabbits and 7 rats were injected with *Bothrops* venom, 2 rabbits intravenously, the rest subcutaneously, and 4 rabbits and 2 rats with *Crotalus* venom subcutaneously. Three dogs were also inoculated with the latter.

[The letterpress states that the dogs received the venom intramuscularly, but the protocols give it subcutaneously.] Animals injected with *Bothrops* venom died, 11 of them in periods varying widely between 5 minutes and 71½ hours ; of those receiving *Crotalus* venom, 4 died between 3½ hours and 51 hours 40 minutes. The dosage varied and the venom might be given in a single dose, or in repeated doses on the same day or on consecutive days for 23 days, the total dosage ranging between 250 microgrammes and 50 mgm. of the dried venom. Death, if rapid, took place in syncope after convulsions ; if at a later period, with tachypnoea, muscular tremor and prostration. Organs and tissues were fixed in Bouin's fluid and examined in frozen sections or after embedding in paraffin. Macroscopic and microscopic lesions are detailed for each of the venoms, both as letterpress and in tables.

The following summary presents the main features : Macroscopically, *Bothrops* venom caused haemorrhage and necrosis of the skin, hyaline thrombi in the pulmonary arterioles and capillaries (these appear to constitute a valuable diagnostic sign—possibly pathognomic—of *Bothrops* poisoning) ; there were also hyperaemia and intraglomerular haemorrhages in the kidneys, which Pearce had described in *Crotalus adamanteus* poisoning [but in the authors' conclusions they state " . . . no signs were found of glomerulonephritis in the animals with bothropic venom . . . ."] and no gross changes in the nervous system. *Crotalus* venom caused acute glomerulo-nephritis but no haemorrhages in the kidneys [thus stated in the table on p. 83, but in their summary they state : " Signs of focal glomerulonephritis were found only in the 3 dogs inoculated with the venom of *Crotalus terrificus terrificus* "], but definite changes were seen in the central nervous system—hyperaemia of the cerebellum, haemorrhage in the brain and meninges, the bulb and spinal medulla. Hyaline thrombi were not seen in the pulmonary capillaries.

The authors conclude : " Therefore, the type of lesion produced in the organs by snake poison seems to depend on the zoological species of the animal used in the observation. It also varies in accordance with the quality of the poison, which in turn depends on the genus and probably also on the zoological species of the serpent from which the poison was obtained." The histological lesions are well shown in a series of 23 photomicrographs, 4 of them coloured reproductions of stained sections. *H. Harold Scott*

Ruiz, J. M. Sobre a distinção genérica dos *Crotalidae* (*Ophidia* : *Crotaloidea*) baseada em alguns caracteres osteológicos. [**Generic Differentiation of the** *Crotalidae* (*Ophidia* : *Crotaloidea*) **based on some Osteological Characters**] *Mem. Inst. Butantan.* 1950–51, v. 23, 109–14, 28 figs.

The English summary appended to the paper is as follows :—

" This paper deals with the generic differentiation of the *Crotalidae*, based on osteological characters of the maxillopalatal complex.

" This work is based on the examination of 11 *Bothrops* species, 11 *Crotalus*, 2 *Sistrurus*, 4 *Agkistrodon*, 2 *Trimeresurus* and 1 *Lachesis*."

Rindani, T. H. **The Effect of Cobra Venom on Frog Intestine.** *Indian Med. Gaz.* 1952, May, v. 87, No. 5, 200–202.

" 1. The paralysing action of cobra venom on the smooth muscle of frog's intestine is reported.

" 2. Presence of drugs like adrenaline and acetylcholine have a definite modifying influence on the effect of cobra venom."

Vachon, M. Compléments à la description du petit Scorpion mauritanien *Lissothus occidentalis* Vachon, 1950, famille des *Buthidae* E. Simon. [**Supplementary Description of the Small Mauritanian Scorpion,** *Lissothus occidentalis*] *Arch. Inst. Pasteur d'Algérie.* 1952, June, v. 30, No. 2, 172–7, 7 figs.

Micks, D. W. **Clinical Effects of the Sting of the "Puss Caterpillar"** (*Megalopyge opercularis* **S. & A.**) **on Man.** *Texas Reports on Biol. & Med.* 1952, v. 10, No. 2, 399–405, 2 figs.

"Eighteen cases of 'puss caterpillar' sting in man are reported, eight of whom suffered severe reactions. The symptomatology and response to treatment are discussed." [See this *Bulletin*, 1922, v. 19, 599, 843.]

TROPICAL OPHTHALMOLOGY

Pagès, R., Paqui, A. & Dernoncourt, Y. De la présence d'inclusions morphologiquement identiques à celles du trachome, sur la muqueuse du col de l'utérus chez 50% des femmes trachomateuses examinées. [**Presence of Inclusions Morphologically Identical with those of Trachoma in the Cervical Mucosa of 50 per cent. of Trachomatous Women Examined**] *Maroc Méd.* 1952, Mar., v. 31, No. 322, 213–15.

Cervical smears were taken from 43 trachomatous women in Morocco. The smears were stained with 1 per cent. methylene blue in citric acid after Poleff [this *Bulletin*, 1952, v. 49, 312]. Dr. Poleff himself examined and checked the smears.

Twenty-two of the smears showed inclusions morphologically like those of trachoma. Similar inclusions were found in conjunctival smears from 9 out of 31 children of 27 of the women.

The authors incline to the view that trachoma is an oculo-genital disease, as suggested by Japanese workers, but are properly guarded in their conclusion. They also discuss the possibility that children may acquire trachoma from the genital tracts and fingers of mothers with the cervical infection.

E. T. C. Spooner

See also p. 1066, Sarkies, **Antrypol in the Treatment of Onchocerciasis.**

HEAT STROKE AND ALLIED CONDITIONS

Ladell, W. S. S. **Problems of Heat Physiology in Palestine. Report to the Colonial Med. Res. Committee.** 22 pp. [10 refs.] 1948. Jerusalem: Board for Sci. & Indust. Res. [100 Mils; 2*s*.]

The report is based on an 8-day tour of Palestine made in January 1947.

The temperatures and humidities prevailing in Palestine in the summer are below the level at which a marked incidence of clinical effects of heat would be expected, but there does develop a lassitude which is accompanied by objective clinical signs. Many people report sick with "asthenia", with histories of dizziness, lack of appetite, and gastro-intestinal symptoms, and their arterial blood pressure is low.

Standards of thermal comfort are low. In the winter months industrial workers live in thin-walled, unheated houses designed for the tropics and unsuitable for colder climates ; they are then more prone to feel the effects of the hot weather when it arrives. A contributory factor to summer lassitude may be unrestful sleep or sleeplessness due to excessive heat indoors.

In the Dead Sea area workers are said to lose 8 or even 10 litres of sweat a day. Low urine volumes (300 cc. a day) have been reported with a total sodium chloride content of 2 to 3 gm., but even so the blood chloride was low.

Visits to industrial establishments showed that needless stresses were imposed on the workers. There was much " wild " heat and needless exposure to dust.

Attention is drawn to the need for houses—and buildings generally—to be designed with due regard to the requirements of the climate.

Some remarks are made about the effects of the climate on various breeds of cattle.

Among the recommendations made are various suggestions for suiting buildings to the climate, for protecting them from solar heat, and for cooling the air. Research is needed on building design. There is need for further study of summer lassitude, which should be defined clinically. Study of the potash-content of the air in the Dead Sea area and its effect on men should be made. Attention should be given to the effects of dust in various trades. In Palestine there is good scope for physiological work on acclimatization and for practical work on tropical clothing. *Thomas Bedford*

Mole, R. H. **The Deleterious Effects of Exposure to Tropical Environments.** *Practitioner.* 1952, June, v. 168, No. 1008, 574–82.

Vandenplas, A. Influence de la température et de l'humidité de l'air sur les possibilités d'adaptation de la race blanche au Congo Belge. [**Influence of Atmospheric Temperature and Humidity on Adaptation of White Persons to Conditions in the Belgian Congo**] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales. Mémoires.* (Collection in-8°.) 1950, v. 19, No. 1, 60 pp., 16 figs. [47 refs.]

Kawahata, A. **Studies on the Function of Human Sweat Organs. (Report I.)** *J. Mie Med. College.* 1950, Mar., v. 1, No. 1, 25–41, 3 figs. [27 refs.]

MISCELLANEOUS DISEASES

Gelfand, M. & Barnett, E. E. **A Peculiar Syndrome of " Bladder Paralysis " in Natives of South Central Africa.** *Brit. Med. J.* 1952, May 31, 1172–3, 2 figs.

The authors report the occurrence in male African adults of a form of bladder " palsy ". This lasts for several days and is followed by complete recovery. The patient is usually between 20 and 50 years of age and has previously been in good health when he suddenly finds that he can pass only small quantities of urine. After approximately 24 hours have elapsed he is unable to pass any, the bladder then becomes grossly distended and overflow incontinence develops. No evidence of urethral obstruction is found in these cases, the patient suffers little discomfort, and a small, soft catheter can be passed with ease. The bladder regains tone over the succeeding few days and recovery is usually permanent, though occasionally relapses occur after a month or so. These are less severe than the initial attack.

No systemic abnormalities have been found in the patients, but all so far observed have had diffuse schistosomal lesions in the bladder. In the region in which the condition has been observed, schistosomiasis is very prevalent, and it is not known whether its presence in the cases is incidental or not.

The authors consider that the condition is not obstructive, and is unlikely to be encephalitic in origin in view of the absence of clinical signs of involvement of the nervous system. They consider a hysterical state improbable as the course of the disease is so constant, and they tentatively raise the possibility of it being caused by diffuse schistosomal lesions in the bladder.

A. W. Woodruff

Oomen, H. A. P. C. **The Clinical Course of Rhinoscleroma.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, June, v. 4, No. 2, 124–33, 1 fig. [11 refs.]

This paper is based upon a clinical description of rhinoscleroma in a village in N. Celebes, in which more than 2 per cent. of 1,100 inhabitants proved to be infected.

All stages of rhinoscleroma may be confused with other diseases. The relationship with this disease was obvious in most patients with nasal anomalies. The bacteriological examination of nasal smears is most important, as well as the results of complement-fixation reaction. House relationship plays a most important part in epidemiology.

The clinical course of 16 patients over a period of 5–15 years is described. All from whose smear the scleroma bacillus could be isolated and who returned for follow-up examination suffered from chronic inflammation of the whole nasal mucous membrane, of atrophic or hypertrophic type, or both. The specific cause of ordinary rhinitis could usually be assumed by the family relations. Among the 16 there was only one with an enormous nasal tumour.

In most patients the general condition is scarcely influenced by the scleroma infection. The granuloma may develop after chronic rhinitis and this was noted in 5 patients. Spontaneous disappearance of granuloma was observed in 9 cases : 7 were localized in the anterior part of the nasal cavity, one was on the wall of the pharynx and one in the larynx.

Development and disappearance of granuloma was seen in 4 patients : in 2 the time required for the process was accurately known.

Development of fresh granuloma in old scar tissue can occur, while atrophy may be stationary for a time, without formation of granuloma, as was observed in 6 cases. An obstinate, mucopurulent rhinitis may change into an atrophic condition without granulomata and the granulomatous condition may remain active for many years. In an examination of 353 schoolchildren in only 5 was the scleroma bacillus found on examination of the nasal flora.

Full details are given of the 16 patients. *Philip Manson-Bahr*

Rudra, M. N. **Toxic Principle of** *Lathyrus sativus*. [Correspondence.] *Nature*. 1952, July 19, 124–5.

The author, writing from Bihar, records the findings of 22·9 mgm./100 gm. of selenium in *L. sativus* compared with 1·2–5·0 mgm./100 gm. in 4 other pulses which are harmless. Because of the higher degree of utilization of selenium (86 per cent. in some cases), the high content is readily transported to the tissues.

Graded intraperitoneal injections of selenium in monkeys resulted in degeneration of the pyramidal tract and more widespread lesions in the cerebral

cortex. Alkaline serum phosphatase was increased, a finding already observed by the author with BHATTACHARYA in cases of lathyrism [this *Bulletin*, 1946, v. 43, 787].

The mechanism of action of selenium is discussed with special reference to the interference with methionine metabolism : methionine excretion falls in lathyrism during consumption of the vetch pea and there is disturbance of the metabolism of biotin and thiamine.

The author gives reasons for believing that selenium may interfere with enzyme systems requiring the sulphydryl or sulphamethyl groups for activity. The investigation is being continued : but the author can state that " the toxic substance of *L. sativus* responsible for lathyrism has been identified as selenium ". *H. J. O'D. Burke-Gaffney*

ALEXANDER, R. M. **Tick Paralysis. Report of a Case in Florida.** *J. Amer. Med. Ass.* 1952, July 5, v. 149, No. 10, 931–2.

" A case of tick paralysis in Florida with fatal termination is described. It is emphasized that the only treatment is the early removal of the offending ticks."

JELLIFFE, D. B. **The Origin, Fate and Significance of the Umbilical Hernia in Nigerian Children. (A Review of 1,300 Cases.)** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, July, v. 46, No. 4, 428–34, 4 figs. & 2 diagrams.

PROTOZOOLOGY : GENERAL

MILTZOW, Gisela. Ein Beitrag zur Klinik und zum Infektionsmodus der Erwachsenen-Toxoplasmose. [**A Contribution to the Clinical Aspects and Mode of Infection in Toxoplasmosis in the Adult**] *Ztschr. f. ärztl. Fortbildung.* 1952, July 1, v. 46, No. 13, 360–62.

A description is here given of a case of toxoplasmosis in a hospital midwife which, after certain difficulties in diagnosis, was ultimately established by means of the new complement-fixation test of Westphal and the Sabin-Feldman test. The illness resembled typhoid with fever, meningeal symptoms, delirium and the passage of foetid stools containing blood and mucus. The patient ultimately became free of symptoms. Shortly before the onset of the illness the patient had delivered 2 women, one of whom had given birth to a dead child at the 8th month and the other to a premature child which died after 3 days. Both women gave positive serum reactions to the Westphal test. Several other sera from women who had in the last 2 or 3 years given birth in the hospital to premature or still-born babies were also found to be positive. It is believed that there must be a considerable amount of toxoplasmic infection in central Germany. *M. E. Delafield*

STEEN, E. **Acute Experimental Toxoplasmosis treated with Aureomycin.** *Acta Path. et Microb. Scandinavica.* 1950, v. 27, No. 6, 844–50. [14 refs.]

" There is no doubt that aureomycin is effective in the treatment of acute toxoplasmosis in white mice. But aureomycin does not sterilize the infection, which is only suppressed. The recovery rate is the higher the earlier in the course of the disease the therapy is started. When treatment is instituted 48 hours after the inoculation or later, no animals will survive, but they will not

die so soon as the untreated group. When treatment is begun simultaneously with the infection, all mice recover. These facts indicate that aureomycin probably will be useless or only of limited value in the treatment of a human case where the diagnosis only can be made after the symptoms have become manifest. Under such circumstances the treatment with aureomycin probably will come too late.

" Aureomycin does not kill the toxoplasma in vivo and eradicate the infection. It only aids in producing the carrier state. In every instance tested the cured mice proved to be carriers and immune to a new infection with toxoplasma.

" Aureomycin is toxoplasmacidal in vitro. The protozoa are really killed, but only in so high concentrations of aureomycin that they can not be reached in vivo."

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Goldman, L., Rockwell, Evelyn & Richfield, D. F. **III. Histopathological Studies on Cutaneous Reactions to the Bites of Various Arthropods.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 514–25, 7 figs. [13 refs.]

Much attention is now being paid to the control of certain biting arthropods, particularly biting flies, which although not necessarily vectors of disease, nevertheless adversely affect man or his domestic stock by producing troublesome and often severe local reactions, sometimes accompanied by more generalized signs and symptoms. In contrast to this concentration on control, there appears to have been very little research undertaken on the cause of the reaction or on the histology of the lesions produced by these biting creatures. The present paper, which appears to be the first of a series written by members of a research team at the University of Cincinnati, is a detailed and carefully planned study of the histopathology of the local lesions produced in sensitized and non-sensitized human subjects by the bites of various insects, particularly mosquitoes. The results recorded add considerably to our present scanty knowledge of an important subject, and the paper should be read in the original by those interested. The authors' summary and discussion are as follows :—

" The morphology exhibited in the sections of arthropod bite reactions permits a dynamic interpretation. In the search for the blood meal, the biting mechanism of the arthropod appears to penetrate through the epidermis with minimal difficulty. Some spreading factor in the saliva is suggested by the rapid spread of the tissue reaction. The perivascular phases of the reaction also suggest a rapid vascular transportation of the material injected. The sensitivity of an individual to the bite of a given arthropod influences the intensity of the inflammatory response. However, an individual may be sensitive to one arthropod and insensitive to the bites of others. The insensitive individual who develops no clinical bite reaction may be bitten without being aware of it. The histological studies of Boltz (1951) of the skin reactions following injections of needle puncture show that the changes in the skin following a bite by an arthropod is not one of simple ' mechanical ' puncture even in a non-reactive individual. The persistent late nodular response may be due to the intrinsic nature of the bite (including retained cuticular fragments ?) or to a neurodermatitic response secondary to the scratch reaction to itching.

"Histopathologic methods are valuable in the study of bite reactions. Improvements such as vacuum freeze drying technics and histochemical studies may permit more detailed studies of the variations in the cellular response of the individual to the bites of arthropods. With better fixation technics it may be possible to pick up fine bodies retained after the insect bite. Improvement in the technic of study of the biting parts *in situ*, will make possible observations relating to the effect of the artificially induced retention of a piece of the biting apparatus within the skin. It is also possible that isotopic studies with other isotopes and more refined autoradiographic technics may enable us to follow the path of the bite more accurately. Progress in the study of the peripheral mechanisms of reaction of Compound F deposited locally may also help in the analysis of the bite reaction.

"With the bite reaction of an individual determined, it should then be possible to study in detail local and systemic factors which may modify some parts of the bite reaction, as for example, the vascular response, the inflammatory cell response, the degree of pruritus, additive local trauma, etc."

R. M. Gordon

GOLDMAN, L. **Local Effect of Compound F on Reactions to Mosquito Bites.** *J. Amer. Med. Ass.* 1952, May 17, v. 149, No. 3, 265.

The subject was a 46-year-old man with a history of reaction to the bites of mosquitoes and other arthropods. The substances used in the experiments were cortisone acetate, cholesterol and compound F (17-hydroxycorticosterone-21-acetate). The mosquitoes were *Aëdes vexans*, *Aëdes aegypti* and *Anopheles quadrimaculatus*. The severest reactions were from the bites of *Anopheles quadrimaculatus*.

The solutions were injected intradermally and then the mosquitoes were allowed to bite directly over the injection areas. The early or immediate and late reactions were measured and photographed in colour.

Seven experiments were done over a period of 4 months after the injections, and from the figures given of the measurements of the diameters of the reaction sites it seems that compound F had a definite inhibiting effect on both the immediate and late reactions to mosquito bites over the area where the injection was made. Additional experiments are to be made on other persons sensitive to the bites of arthropods.

H. S. Leeson

QUTUB-UD-DIN, M. **On a Collection of Culicine Mosquitoes from Thirmalapur, Nizamabad, (Deccan), India.** *Pakistan J. of Health.* 1952, Apr., v. 2, No. 1, 25–7.

"In a collection received from Thirmalapur, Nizamabad (Deccan), 10 species of Culicine mosquitoes were identified 2 of which are altogether new records from the district and the remaining 8 account for new locality records. In order to give a complete account of the mosquito fauna of the district, attempt has been made to furnish here a list of Megarhine, Anopheline and Culicine mosquitoes so far recorded from Nizamabad."

LAVEN, H. **Crossing Experiments with *Culex* Strains.** Reprinted from *Evolution*. 1951, Dec., v. 5, No. 4, 370–75, 2 figs. [23 refs.]

The use of morphological characters alone as a basis for dividing insects into species or races has proved to be unsatisfactory in several cases in recent years. This is particularly so among the Culicidae where biological differences are usually clear and only minor morphological differences can be found. It has

been shown that *Anopheles maculipennis* in Europe really consists of five or six " species " which differ only slightly in morphological characters, yet markedly in their biology.

Three species have been recognized in the *Culex pipiens* group. These are *Culex pipiens* which is found in temperate zones and is exclusively a bird mosquito, *Culex fatigans* which occurs in subtropical regions, and *Culex molestus* which is similar to *C. pipiens* and is found within the same distribution range, but molests man. *C. molestus* differs from *C. pipiens* in being both stenogamous (able to copulate in confined spaces) and autogenous (able to lay eggs without a previous blood meal).

The author carried out reciprocal crossing experiments between five *Culex* strains, all of which were autogenous and stenogamous. With very few exceptions most females were inseminated, but only eggs of certain crosses hatched. There appeared to be two complexes ; crosses between mosquitoes from London and Paris were fertile, and crosses between mosquitoes from Hamburg, Immenrode, and a hybrid strain (obtained by crossing the Hamburg and Immenrode strains) gave fertile eggs. Another strain, however, (Oggelshausen) was intermediate between all the other strains but only in the males. The males gave fertile progeny when crossed with females of any of the other strains, but when females of the Oggelshausen strain were crossed with males of any other strain fertile eggs were obtained which did not hatch.

Within the groups *C. pipiens*, *C. fatigans* and *C. molestus* there seem to be other units, either species, races or genetically differentiated populations the rank of which cannot yet be determined. *C. M. Harrison*

Hassett, C. C. & Jenkins, D. W. **The Uptake and Effect of Radiophosphorus in Mosquitoes.** Reprinted from *Physiol. Zoöl.* 1951, July, v. 24, No. 3, 257-66, 5 figs.

Radio-isotopes were used as tracers to study the flight range of mosquitoes (*Aëdes aegypti*) in 1949. This paper describes laboratory experiments to ascertain the optimal conditions for producing radio-active mosquitoes, the mode of entry of the phosphorus into the larvae and the effects of radiation on these insects.

Radio-active adults and larvae were produced by adding radio-phosphorus in the form of $H_3P^{32}O_4$ to the larval rearing medium. *Aëdes aegypti*, *Aëdes atropalpus*, *Culex pipiens*, and *Anopheles quadrimaculatus* all became radio-active when treated in this way.

First and second instar larvae proved to be very sensitive to radiation injury, and late fourth instar larvae ceased to feed and took up little phosphorus, but the uptake of phosphorus by late third instar and actively feeding fourth instar larvae was very rapid. The amount of P^{32} available per larva in the medium determined the radio-activity of the adult mosquitoes ; 0·1 microcurie of P^{32} per larva in 1 ml. of water was found to be most satisfactory. Female mosquitoes contained approximately three times as much phosphorus as males, which can probably be explained on the basis of the greater weight and size of the females.

Approximately 50 per cent. of the available phosphorus entered the larvae, absorption taking place largely through the gut and through the anal gills. The rate of accumulation of phosphorus in larvae with the anal gills removed was considerably less in the first 30 hours than in larvae with anal gills, but the final amount of phosphorus absorbed was the same in both cases. P^{32} was found distributed through all parts of the body in proportion to the mass of the part, with the exception of the Malpighian tubules, which contained 20 per

cent. of the total. The abdomens of females also contained a higher percentage than abdomens of males, probably owing to a heavy uptake of phosphorus by the ovaries.

Larval growth was inhibited by high concentrations of P^{32} in the larval medium. The early instars were affected by 0·05 microcurie per ml. Pupation was delayed and inhibited by concentrations above 0·5 microcurie per ml. and above 5·0 microcuries per ml. pupation rarely occurred. Adults emerging from larvae treated with over 0·1 microcurie per ml. did not lay eggs, but behaviour appeared to be normal in adults reared from larvae in P^{32} solutions of 1·0 microcurie per ml. or less.

Adult mosquitoes could also be made radio-active by feeding them on radio-active animals and material, *e.g.*, rats and rabbits injected with P^{32}, raisins soaked with P^{32}, radio-active flowers or sugar solutions. *C. M. Harrison*

West, A. S. **The Canadian Arctic and Sub-Arctic Mosquito Problem.** Reprinted from *New Jersey Mosquito Extermination Ass. Proc.* 1951, 105–10.

The mosquito population in the areas of Arctic and Sub-Arctic Canada is so enormous that no thought can be given to the idea of extermination. Control can be considered but only in its broadest sense and the main problem is to learn how to live with the mosquitoes.

In these circumstances percentage mosquito mortalities have no meaning, for after treatment by insecticides or other measures reinvasion is the major factor. The actual remaining mosquito population is still the only true criterion of the effectiveness of any control measures.

Repellents now in use do help people to continue working for a time. The design of protective clothing is also being studied. Meteorological matters are continually being investigated for it is thought that in time forecasts of the mosquitoes' activities may become possible, thus enabling people to take avoiding action. The study of immunity to mosquito bites is also being undertaken.

There are more than 15 species of mosquitoes and at least 6 of them are major pests. All aspects of mosquito biology are being intensively pursued, especially the question of fluctuating populations which may provide some clue to "control". However, the freedom from mosquito-borne diseases in the North may be a matter of density of the human population and as the population increases an incidence of such diseases might be expected. At present, the transmission of disease seems to be limited to the possibility of the transmission of the encephalitides. In Saskatchewan, *Culex restuans* has been shown to be a vector of equine encephalitis and there have been epidemics in lemmings, the arctic fox and the huskie dog. A recent human epidemic has been reported from Iceland. It is certain, however, that there will be a mosquito problem in Arctic and Sub-Arctic Canada for many years to come. *H. S. Leeson*

Gjullin, C. M. & Peters, R. F. **Recent Studies of Mosquito Resistance to Insecticides in California.** *Mosquito News.* 1952, Mar., v. 12, No. 1, 1–7.

Conditions in the irrigated pasture areas of the San Joaquin valley, California, are ideal for mosquito breeding. The most prevalent species are *Aëdes nigromaculus*, *Aëdes dorsalis*, *Culex tarsalis*, and *Culex fatigans*. DDT larvicides gave a good control of these species during 1945, 1946, 1947, and 1948, but in 1949 DDT failed in one instance. Toxaphene, gamma BHC, and lindane, which were used in areas where DDT was ineffective, also failed to give adequate control in some parts of the San Joaquin valley in 1950 and 1951. Mosquito larvae collected from treated areas proved to be resistant to DDT when compared in

laboratory tests with larvae from untreated districts. Early fourth-instar larvae were placed in tap water, and a determination was made of the parts per million of DDT in acetone necessary to give a 50 per cent. kill after 24 hours.

Aëdes nigromaculus larvae from treated areas were found to be 3 to 7 times more resistant to DDT than those from untreated areas. Larvae from one part of the Kern district were approximately twice as resistant to toxaphene, lindane and aldrin as those from a control area. Larger doses of DDT, lindane and aldrin were required to give a 50 per cent. kill of *Aëdes dorsalis* than *Aëdes nigromaculus* larvae, but *Aëdes dorsalis* larvae from treated areas also proved to be 3 to 12 times as resistant to DDT as larvae from untreated parts.

Larvae of *Culex tarsalis* had a resistance to DDT ranging from 3 to 10 times, while in one district (Kern country) they were resistant not only to DDT but they also had a resistance of 33 times to toxaphene, 11 times to lindane, 215 times to aldrin and 1,300 times to heptachlor.

It seemed possible, from analysis of water samples, that larvae develop resistance to insecticides much more readily in waters with a high chemical content than in those with a low chemical content. A dosage of 1 lb. per acre of DDT gave a good control of *Culex tarsalis* larvae in one area, but a second similar application failed.

Culex fatigans larvae appeared to be slightly resistant to DDT, toxaphene, lindane, and heptachlor but no untreated larvae were available for comparisons.

C. M. Harrison

TWINN, C. R. **A Review of Studies of Blood-Sucking Flies in Northern Canada.** Reprinted from *Canadian Entom.* 1952, Jan., v. 84, No. 1, 22–8. [27 refs.]

Beyond the tree line on the arctic tundra of northern Canada mosquitoes are " a terrible scourge " ; in the forest areas the pests are, besides mosquitoes, black flies (Simuliidae) deer flies and moose flies (Tabanidae).

The organized study of these insects began in 1947. The investigations are divided into 4 categories : taxonomy and distribution ; biology and control ; botany ; special projects. This paper deals with biology and control.

Among the mosquitoes the species of *Aëdes* are the most troublesome. They have one generation a year and pass the winter in the egg stage beneath the snow and ice. Attempts to rear the northern species of *Aëdes* in the laboratory have so far failed. All the species of Simuliidae breed in running water, one of them (*Simulium pictipes*) breeds only in water-falls. Some pass the winter as eggs and some as larvae. Severe pests of man are *S. venustum* and *Prosimulium hirtipes*. Tabanidae appear to prefer animals but they can be very troublesome pests of man. The larvae of *Tabanus* spp. feed on small animals such as insect larvae and snails ; larvae of *Chrysops* spp. seem to obtain their food from organic matter in moss. Winter is passed as larvae and the life-cycle may take 3 years.

In mosquito control as little as 0·1 lb. of DDT in fuel oil per acre has been found effective against larvae. Mosquito control around R.C.A.F. bases has been done from aircraft when 0·25 lb. DDT in fuel oil per acre was used. It was found that two applications were necessary ; one against larvae and a second against adults. The average mortality achieved was 91 per cent. of larvae and 85 per cent. of adults.

Against *Simulium*, DDT in fuel oil was also used, at the rate of one part per 10 million parts of water. When maintained at the point of application for 15 minutes this treatment cleared the Saskatchewan river of *Simulium arcticum* for 117 miles. Similar treatments in clear streams were effective for shorter distances. Other experiments included treatment by 10 per cent. DDT in fuel oil from helicopter, ground level and from a boat. Black fly infestation was reduced over 4 to 6 miles' radius but some flies were still active late in the season.

Investigations into aerosols are continuing. In open areas treatment requires an atmosphere with temperature inversion and a wind velocity of 2 to 3 mph. This is effective up to 500 yards but more usually to 100 yards. Wooded areas require a wind velocity of 4 to 7 mph for the aerosols to be effective.

More than 200 compounds have been synthesized in the study of repellents. Most have been tested with *Aëdes aegypti* and human subjects and a dozen were found to be equal to or better than dimethyl phthalate ; these are being submitted to field tests.

In the study of the factors attracting mosquitoes to man the following were found to be important : warmth, moisture, carbon dioxide, perspiration and dark-coloured clothing.

A summary account of these investigations has been published and papers on the various phases of the work have appeared in scientific journals [and been noticed in this *Bulletin*]. *H. S. Leeson*

HOCKING, B. & RICHARDS, W. R. **Biology and Control of Labrador Black Flies (Diptera : Simuliidae).** *Bull. Entom. Res.* 1952, July, v. 43, Pt. 2, 237–57, 4 text figs. & 6 figs. on 2 pls. [25 refs.]

Over the greater part of Labrador and northern Quebec there are many turbulent streams and rivers providing the ideal habitat for black flies (Simuliidae). The population of black flies in this area is incredibly large, in spite of the fact that female flies may have difficulty in obtaining blood meals, since the human population is probably less than one person per 25 sq. miles and mammals and birds are not abundant. Owing to the establishment of an air base at Goose Bay and the development of an iron ore industry, black flies are pests of considerable importance.

Larvae of *Simulium* may be killed by the application of DDT to rivers and streams. Spraying with insecticides against the adult flies is frequently unsatisfactory because of repopulation soon afterwards. Whether the use of DDT against the larvae is an adequate method of control depends on the flight range of the most important species, and the distribution of the breeding sites.

In a survey of streams and rivers near Goose Bay 25 species of black fly (including 6 undescribed species) were recorded and observations were made on their relative abundance, seasonal appearance, temperature requirements and larval habitats. The two most important species in the area proved to be *Simulium venustum* and *Prosimulium hirtipes*, the percentage of the former found in a cloud attacking man being 93·1 and of the latter 4·4.

The larval habitats in an area of 200 sq. miles with a radius of 8 miles from the centre of the airfield were treated with insecticide. A survey showed that 86 streams required no treatment because of little or no flow of water, but 77 streams were treated from a helicopter, the ground or from boats, with 10 per cent. DDT in fuel oil with an auxiliary solvent. The dosage aimed at was 1 part of DDT in 10 million parts of water for 15 minutes.

Three factors ; the number of flies landing on front of trousers between the waist and the knee (the landing rate), the number of flies taken in 10 sweeps with a net (the sweep count), and the time taken for the first penetration on the forearm when exposed from the wrist to the elbow (the biting rate), were used to assess the value of treatment of the larval habitats with insecticide.

The control of black flies was clearly adequate at the centre of the treated area throughout July and August and into early September. As far as six miles from the centre there was no evidence of an increase in population which usually occurs in August. In early September there appeared to be a slight migration from the outside to the centre of the treated area. *S. venustum*

moved into the central area more rapidly than *P. hirtipes*. The elimination of larvae of *P. hirtipes* from a radius of two miles should give protection for one season, but with *S. venustum* elimination of larvae over a radius of six miles is necessary. No mortality of fish or other economically important animals was noticed. It is suggested that the use of large aircraft to distribute DDT along important watersheds would be a great economy in labour, but would be more costly in insecticide and there would be a greater risk of damage to other fauna.

C. M. Harrison

Parrot, L. & Clastrier, J. Notes sur les Phlébotomes. LXV.—Phlébotomes d'Indochine. [**Notes on** *Phlebotomus*. **LXV.** *Phlebotomus* **of Indo-China**] *Arch. Inst. Pasteur d'Algérie*. 1952, June, v. 30, No. 2, 153–71, 14 figs. [30 refs.]

Mitra, R. D. & Roy, D. N. **Notes on Sandflies. Part I.** *Phlebotomus smithi* **sp. nov.** *Indian Med. Gaz.* 1952, May, v. 87, No. 5, 187–8, 5 figs.

Mitra, R. D. & Roy, D. N. **Notes on Sandflies. Part II.** *Phlebotomus thapari* **n. sp.** *Indian Med. Gaz.* 1952, May, v. 87, No. 5, 188–93, 9 figs.

Yates, W. W., Lindquist, A. W. & Butts, J. S. **Further Studies of Dispersion of Flies tagged with Radioactive Phosphoric Acid.** *J. Econom. Entom.* 1952, June, v. 45, No. 3, 547–8.

Harrison, R. A. **The Occurrence in New Zealand of Houseflies resistant to D.D.T.** *New Zealand J. Sci. Tech.* 1951, v. 32 (B), No. 5, 40–43.

Fay, R. W., Stenburg, R. L. & Ernst, Ann H. **A Device for recording Insecticidal Knockdown of House Flies and evaluating Residual Deposits.** *J. Econom. Entom.* 1952, Apr., v. 45, No. 2, 288–92, 6 figs.

" Knock-down " (*i.e.*, the point at which an insect becomes paralysed by an insecticide and falls on to its back) is frequently used to evaluate the effectiveness of an insecticide. The authors devised a tape recorder for collecting insects as they fall from a surface treated with insecticide. Some 400 flies were released into a cage the top and sides of which were plywood panels treated with 200 mgm. of insecticide per sq. ft. The bottom of the cage consisted of a funnel leading into a V-shaped compartment made of adhesive cellulose tape. When the flies were affected by the insecticide they fell into the funnel and passed between the two adhesive ribbons of tape which were then wound on to a reel. The tape could move at either 3 feet per hour or 16 feet per hour. At the end of the exposure period the tape was subdivided into units of time, and the numbers of flies and the sexes were recorded.

Of 11 insecticides tested in this way, pyrethrin, BHC and DDT gave the quickest " knock-down ", and heptachlor, TDE and toxaphene the slowest. " Knock-down " occurred between 10 and 30 minutes with halogenated hydrocarbons related to DDT, but with halogenated hydrocarbons of the aldrin-chlordane type " knock-down " started only after a period of 30–90 minutes' exposure to the treated surface. Females were " knocked-down " more slowly than males, and this difference was accentuated with the slower-acting insecticides.

C. M. Harrison

Sun, Yun-pei & Sun, Jung-yi T. **Microbioassay of Insecticides, with special reference to Aldrin and Dieldrin.** *J. Econom. Entom.* 1952, Feb., v. 45, No. 1, 26–37. [16 refs.]

In this paper an attempt is made to reveal certain important principles used in the microbioassay of toxicants for which there may be no sensitive chemical

method of analysis. The authors describe general procedures of carrying out such tests, and compare different methods of estimating the sensitivity of each determination.

The insecticidal residues are evaluated with a residue method by which adult house-flies are continuously exposed to a " dry " film of deposit obtained by allowing an aliquot of the extract to evaporate to dryness, and observing mortality after 24 hours. The basis of the principle is that deposits containing the same amount of the same toxicant and the same quantity and quality of extracted substances should give the same percentage of mortality. Thus standards should be prepared by adding suitable amounts of the same toxicant to a blank extract obtained from an untreated control in the same way as the treated samples.

On a comparative basis the extracted substances other than toxicants should not change the results but decrease the sensitivity. For in addition to a purely physical action in diluting the active toxicant, the extracted substances may sorb the toxicant and mask its effect. If the extract of either a sample or standard does not contain the same amount of total residue, the volume pipetted into each jar to produce the " dry " film should be adjusted so that the total residue should be the same in all cases.

To increase the sensitivity of microbioassay, a known amount of the same toxicant is added to the treated extract which contains a small, but sublethal, amount of toxicant. The actual quantity of toxicant in the residue is obviously obtained by subtracting the added value from the result. By using this method 0·4 microgramme of aldrin or dieldrin in a few milligrammes of residue per jar can be determined, that is about 0·1 p.p.m. in a 100 gm. sample. The approximate sensitivity of the residue method can be calculated by the following equation and expressed in p.p.m. of the toxicant in a sample. $\text{Sensitivity} = \pm D \times F / R \times V$ where D is the LD50 of a standard curve expressed in microgrammes of a toxicant per jar ; F is a factor of accuracy which may vary from one-fifth to one-tenth depending upon the number of replicates and accuracy of the results ; R is the extraction ratio expressed as the number of grammes of a sample per millilitre of final extract ; and V is the volume of a treated extract in millilitres added to each jar. *Thomas E. Fletcher*

BARLOW, F. & HADAWAY, A. B. **Some Factors affecting the availability of Contact Insecticides.** *Bull. Entom. Res.* 1952, Mar., v. 43, Pt. 1, 91–100. [14 refs.]

This paper shows how important it is when comparing the potency of several insecticides that each substance should be in the same physical condition and be equally available to the insects. Three dispersing media are discussed, namely, oil solutions, emulsions and aqueous suspensions.

When oil solutions of insecticides are applied to absorptive surfaces, the insecticide is rendered ineffective owing to absorption of the solution. On a non-absorptive surface, oil solutions are the most efficient formulations but only so long as the deposit remains wholly or partly liquid. Inclusion of 10 per cent. of a vegetable oil in a kerosene solution does not prevent crystallization but increases the effectiveness of the deposit by maintaining an oil film on the crystals, whereas a dry crystalline deposit is much less efficient. One disadvantage of oil solutions used outdoors is that DDT is more readily decomposed by sunlight in solution than as a solid deposit.

On some fibrous absorptive surfaces, a solution of DDT in oil remains in a supersaturated condition in and around the fibres. If crystallization is stimulated by mechanical means, such as by the movement of insects on the surface, then the resulting crystals project from the surface, and it is suggested that, in

these circumstances, crystals are more readily available to insects than the oil solution from which they were derived, for the surface becomes more toxic. DDT on compressed fibre board shows the induced crystallization to a greater extent than other insecticides, a 5–10 per cent. solution of DDT in a solvent of medium boiling point (120–200°C.) showing the phenomenon best. It is concluded, therefore, that fibre board and similar surfaces should not be used in comparing the potencies of chlorinated-hydrocarbon insecticides applied in oil solutions, as DDT would be more available than others.

The observations made concerning oil solutions also apply to a large extent to emulsions which, on many surfaces, behave as oil solutions with probably some additional complications due to the presence of sticky and hygroscopic materials such as stabilizers and emulsifiers which increase adherence.

Insecticides are more readily available when applied as solid suspensions to absorptive surfaces. Effectiveness of the deposit depends on the shape and size of the particles, the percentage of inert diluent present and the adherence of the particles to the surface. There is an inverse relation between effectiveness and size of the DDT particles, those of less than 20 microns in diameter being most effective for mosquitoes. The presence of an inert diluent may reduce the availability of the insecticide owing to both a masking effect of the diluent covering some of the insecticide, and to the adherence of inert diluent to the insect and so reducing the maximum pick-up of the insecticide. When an aqueous suspension is applied to a non-absorptive surface the wetting agent remains on the surface and on drying causes the particles to adhere too strongly to the surface. Evidence is given that penetration of wetting agent into a porous surface is not complete and that even small amounts remaining on the surface may affect the availability of the insecticide. Furthermore, whereas the availability of deposits of dry dusts on plaster is not affected by relative humidity, that of deposits from aqueous suspensions is. The deposit kept in a lower relative humidity had more readily available insecticide and this was shown by chemical determination of DDT picked up by mosquitoes. It was also emphasized that in the use of " stickers " to withstand weathering action of rain, a balance must be obtained between weathering ability and the availability of the insecticide to insects. *Thomas E. Fletcher*

VAN TIEL, N. **Improvement of the Residual Toxicity of DDT Solutions by the Addition of Coumarone Resin.** *Bull. Entom. Res.* 1952, July, v. 43, Pt. 2, 413–19, 5 figs. [10 refs.]

It is well known that the toxicity of DDT residues depends on the particle size, the smaller DDT crystals being more toxic than large ones. Kerosene is very frequently used as the solvent for DDT but the crystals formed from DDT in kerosene solutions are long and needle-shaped.

The effectiveness of DDT in kerosene was compared with that of DDT in kerosene with a coumarone resin. Small glass plates sprayed with 250 mgm. DDT solution per 100 sq. cm. were made into test boxes and house-flies were exposed to the treated surfaces for 30 seconds and then transferred to tubes for observation. The coumarone resin was found to decrease the crystal size of the DDT. The effectiveness depended not on the absolute content of the resin, but on the ratio of DDT to resin, the residual toxicity reaching a maximum when the ratio of DDT to resin was 10 to 1. The resin could have either a synergistic or antagonistic effect. A 0·5 per cent. resin added to a 4 per cent. DDT solution increased the effectiveness by reducing the DDT crystal size. A 0·5 per cent. resin added to a 1 per cent. DDT solution gave a strong reduction in toxicity because the resin masked the DDT crystals.

When the correct DDT to resin ratio was used the synergistic effect was so strong that the DDT-content could be reduced. A 1·0 per cent. DDT with 0·1 per cent. resin in kerosene was more toxic than a 5 per cent. DDT solution without resin, but this greater toxicity lasted for 69 days only. Three per cent. DDT with 0·3 per cent. resin was more toxic to house-flies than a 5 per cent. DDT without resin throughout the experiment, *i.e.*, for 244 days. Similar results were obtained on the different surfaces of iron, unpainted wood, paper, cotton cloth and mortar.

The addition of resin to DDT in the ratio of 1 to 10 therefore allows a reduction of the DDT content to 3 per cent. In such a case the DDT can easily be dissolved in refined kerosene and does not re-crystallize at low temperatures, so eliminating the necessity of using auxiliary solvents. *C. M. Harrison*

Brown, A. W. A. **Insect Control by Chemicals.**

This book is reviewed on p. 1092.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

Carmichael, J. **Animal-Man Relationship in Tropical Diseases in Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, July, v. 46, No. 4, 385–94. [22 refs.] Discussion 394–402 [Burke-Gaffney, H. J. O'D. ; Garnham, P. C. C. ; Edwards, J. T. ; Hoare, C. A. ; Shortt, H. E. ; Carmichael, J. (in reply)].

Dr. Carmichael gave a summary of some of the chief infections by bacteria, viruses, protozoa and metazoa which are shared by man and other mammals, wild and domestic, in Africa ; the diseases include tuberculosis, anthrax, plague and *Brucella* infections ; rabies, Rift Valley fever, yellow fever, foot-and-mouth disease, and tick typhus ; trypanosomiasis ; taeniasis and oesophagostomiasis. Rinderpest was also mentioned for its importance as an infection of wild and domestic mammals. The author regards rabies as by far the most important virus disease common to man and his domestic animals in Africa and quotes a list of wild animal carriers of the infection.

In the discussion which followed Burke-Gaffney mentioned a recently published list of 80 diseases naturally transmitted between vertebrate animals and man, most of them occurring in Africa and associated especially with dogs, sheep and cattle, and rodents. Garnham referred to relapsing fever, yellow fever, trypanosomiasis and plague as examples of the way in which infection passes between man and animals ; virulence increases as " humanization " of a strain of parasite progresses and newly discovered viruses should be thought of in regard to such increase. It is strange that man should be immune to all piroplasms. Edwards spoke of the attenuation of virulence of *Theileria* obtained by Sergent and his co-workers which enabled it to be used for premunition and led to a reduction in mortality in Algiers from 16·3 to 1 per cent. ; he also referred to Carmichael's work in Uganda on the susceptibility to tuberculosis of two main types of cattle, which confirmed the earlier work of Glen Liston and Soparkar in India who showed that the zebu cattle were much more resistant than the European cattle. Hoare spoke of the relationship between the polymorphic trypanosomes and referred to experiments at Tinde, Tanganyika Territory. He also mentioned the fact that anthropoid apes are naturally infected with plasmodia indistinguishable morphologically from those of human malaria, and that transient infections can be obtained between these hosts. *Trypanosoma cruzi* is common in animals, *Leishmania tropica* in gerbils and

L. donovani in dogs. Professor Shortt asked critical questions on rabies, rinderpest and trypanosomiasis. *J. F. Corson*

SANDOSHAM, A. A. **The Challenge of the Parasite.** *Proc. Alumni Ass. King Edward VII College of Med.* Singapore. 1952, Mar., v. 5, No. 1, 5–14.

In this inaugural lecture by Professor Sandosham, the holder of the newly created Chair of Parasitology in the University of Malaya, the subject of parasitism in relation to medical entomology, protozoology, and helminthology, is introduced briefly but competently. The direct impact of parasites on human health is discussed but the importance of veterinary parasites on human economy is also stressed. After a résumé of some of the pioneer research in parasitology the author gives an outline of the contributions which have been made by workers in Malaya to the elucidation of problems in tropical disease. In discussing the problems which are yet unsolved he remarks that " The gulf between the field of medical parasitology and that of veterinary and agricultural parasitology is small and these aspects of the subject cannot be ignored ". Although Malaya is free from certain parasitic diseases such as sleeping sickness, kala azar and schistosomiasis, and the insect-borne disease yellow-fever, the danger of their introduction has increased in recent years on account of troop movements and the speed of modern transportation. The lecture concludes with an account of the present system of teaching parasitology to medical undergraduates in Malaya and urges the need for further post-graduate study, especially for those intending to specialize in preventive medicine. *J. J. C. Buckley*

GAMBLE, D. P. **Infant Mortality Rates in Rural Areas in the Gambia Protectorate.** *J. Trop. Med. & Hyg.* 1952, July, v. 55, No. 7, 145–9.

In the course of socio-anthropological work, data on births and infant deaths were collected by personal recording in 4 Mandinka villages and one Wolof village over a period of 5 years. The mean infant mortality rate for the former was 420 per 1,000 live births, while in the more prosperous Wolof community it was 165. Death-rates were highest among babies born during the latter half of the rainy season : this was thought to be mainly due to the high transmission rate of malaria, to the general neglect of babies at this season when all women must work in their rice farms and to the effect of the annual " hungry season ". Rates of both still-birth and infant mortality were also highest in first pregnancies and progressively decreased with subsequent pregnancies.

[Although the area covered was small—the total population involved was about 2,700—this is a valuable contribution, as reliable, personally-recorded statistical data relating to the more remote rural African communities are very scanty.] *Dean A. Smith*

SIMONET, P. Observations nouvelles sur la pathologie des Indigènes dans l'Annexe de la Saoura (Beni Abbès, Sud oranais). [**New Pathological Observations on Indigenous People in the Saoura Region, Beni Abbès, South Oran**] *Arch. Inst. Pasteur d'Algérie.* 1952, June, v. 30, No. 2, 134–45, 4 figs. on 2 pls. & 1 map. [Refs. in footnotes.]

The following is a translation of the author's summary :—

A number of new pathological findings were recorded among the people of the Saoura Valley during 1951.

In Haute Saoura :

A focus of vesical schistosomiasis, probably originally imported from Morocco, at Anefid and Agdal, situated 60–65 kilometres below Beni Abbès.

The presence of a focus of Oriental sore at El Ouata, extending the area of this condition to 50 kilometres south of Beni Abbès.

At Beni Abbès :

A case of xeroderma pigmentosum, complicated by malignant melanoblastoma, in a child.

A case of autochthonous leprosy in an Arab-Berber woman who had never left the locality.

[See also this *Bulletin*, 1952, v. 49, 852.] *H. J. O'D. Burke-Gaffney*

Gorgas Memorial Institute. **Annual Report of the Gorgas Memorial Laboratory, 1951** [Siler, J. F., President]. 30 pp., 1 map. 1952. Washington : Govt. Printing Office.

The two proven vectors of jungle yellow fever in South America, *Haemagogus spegazzinii falco* and *Aëdes leucocelaenus*, are inhabitants of the forest canopy of the Canal Zone and adjacent Panama, where human fatal cases of jungle yellow fever have occurred in the past few years. The mosquito survey has been extended to Western Panama and adjacent Costa Rica, confirming the presence of the same mosquitoes ; in the year this involved the examination of 72,000 mosquitoes. Protection tests performed on animals were positive for two spider monkeys and one pigmy-two-toed anteater. Yellow fever virus was isolated from a human patient in West Panama. Technical difficulties in transportation and refrigeration marred the results of a search for a wild animal reservoir of yellow fever in the State of Chiapas in the south-western region of Mexico.

Virus was isolated from 3 cases of acute anterior poliomyelitis from an epidemic in Panama and the disease was successfully transmitted to black howler monkeys.

The collection and classification of *Phlebotomus* sand-flies continues ; specimens are obtained from various parts of Central and South America. This work is the subject of papers in preparation for publication including a *Phlebotomus*-leishmaniasis survey in Paraguay.

Studies of malaria control by drug treatment and DDT residual spraying were continued ; results for 1951 are tabulated. The incidence of malaria and relapse is the lowest recorded during the 22 years of survey in the same area ; the average parasite rate for the whole group of villages in 1951 was less than 1 per cent. compared to the initial parasite rate in 1929 of 45·6 per cent.

Plans for the intensification of the BCG campaign have been completed to cover the whole of the Republic of Panama.

The report concludes with a financial statement for the fiscal year.

R. Ford Tredre

BOOK REVIEWS

Manson-Bahr, Philip H. [C.M.G., D.S.O., M.A., M.D., D.T.M. & H. Cantab., F.R.C.P. Lond.] **Synopsis of Tropical Medicine.** 2nd Edition. pp. xiii+ 248, 7 pls. 1952. London : Cassell & Co., Ltd., 37/38, St. Andrew's Hill, E.C.4. [15*s*.]

Nine years have passed since the first edition of this work was published—nine years fraught with new discoveries and advances in our knowledge of

tropical medicine, To embody all this without unduly increasing the size of the book and, while endeavouring to maintain it as a *Synopsis*, to retain it also as a *vade mecum* can have been no easy task. It has, however, been successfully accomplished by Sir Philip Manson-Bahr and the new edition merits even higher praise than the former. The few small slips have been rectified and, so far as the reviewer can see, none of the major advances has been omitted. To mention just a few : since 1943 we have been given the proof of the pre- and exo-erythrocytic phases of the malaria parasite which has elucidated difficulties and filled in hiatuses in our knowledge of the life-history of the plasmodium ; DDT, Gammexane and other insecticides were then unheard of, at least in their application to tropical medicine, now they are universally used ; new synthetic drugs have been made and tried, and antibiotics, now of service in many diseases, were then little known. Nevertheless, in embodying all this the author has increased the book by only 24 pages. The new work shows evidence of very careful, even word for word, revision. Two new plates have been added, one showing excellently on a single page the complete life-cycle of the malaria parasite, the other depicting very clearly the entamoeba of dysentery.

There is no need to review the work in all the detail of the previous account [see this *Bulletin*, 1943 v. 40, 415]. Without detracting from our praise of the book and our gratitude to the author, may we suggest that in the section on Dhobie Itch (p. 132) or under Dermatitis venenata (p. 164) mention might be made of Dhobie Mark dermatitis, from the use by native washermen of fluid from the *Semecarpus anacardium* for marking clothes ? It produces intense pruritus followed by dermatitis [see this *Bulletin*, 1944, v. 41, 230, 867] for which the dhobie is often undeservedly blamed. The revised table of the chief features of the typhus group is a great improvement. Under Typhoid Fever, the rose spots are said to appear on the 10th day, whereas they tend to appear in successive crops from, certainly, the 7th, and sometimes as early as the 5th day of disease. Lastly, that *C. diphtheriae* might be a cause of veld sore was known some 15 years earlier than the author states (p. 110), namely, in the war in South Africa in 1901.

These are minor points and we conclude by saying that the whole is up-to-date, intensely practical, handy, and fulfils all the requirements of a first-class synopsis. One or two misprints, or misspellings, still remain but they are immaterial among so much that is excellent. Anyone who studies the author's *Tropical Diseases* at leisure and has the *Synopsis* to summarize his knowledge need have no fear in encountering the sternest examiner, while he who has circumvented the latter will be well advised to keep the *Synopsis* always at hand for reference and to brush up his knowledge. *H. Harold Scott*

Bechelli, Luiz Marino & Rotberg, Abrahão. **Compêndio de Leprologia.** [Epitome of Leprosy] 684 pp., numerous illustrations. 1951. Rio de Janeiro : Serviço Nacional de Lepra.

Since 1942 a series of monographs has been published by the Brazilian National Leprosy Service with the double object of spreading the knowledge of leprosy and its control throughout the country, and of providing literature which will be useful throughout the world. No country has spent more in money and personnel for the control of leprosy than Brazil, and in this the State of São Paulo has taken a lead. The present volume, written by two of the principal leprologists of the Department of Leprosy Prophylaxis in the State of São Paulo, meets a long felt need by joining together into one volume these monographs which they had previously produced under the pseudonym of " Natal ".

The volume is divided into 6 parts and an appendix, and bibliography, and again is subdivided into 22 chapters. The Parts are headed consecutively : Aetiology and Pathology, Clinical, Diagnosis, Treatment and Prognosis, Epidemiology, and Prophylaxis. The text is profusely and clearly illustrated with diagrams and photographs, many of which are beautifully executed in colour. Of the 676 pages of the book 200 are devoted to clinical study, the progress and appearances of all the types and subtypes being clearly explained in the text and by means of illustrations. The difficult questions of resistance, immunity and allergy are discussed very fully and the group effects of BCG in producing a positive lepromin test are considered. The chapter on clinical diagnosis and differential diagnosis is particularly helpful.

Under sulphone treatment the long time required in indeterminate cases for recovery is remarked on. However, none of these cases advanced into the lepromatous type, and in the few where a reaction was produced by sulphone treatment the negative lepromin test became positive. The factors which favour the dissemination of leprosy are discussed under age, sex, race, debilitating diseases, diet, sociology and climate. Brazil is a country where many races meet coming from all over the world, but the authors do not consider that leprosy has any predominant prevalence in any particular race.

The part of the volume devoted to prophylaxis brings out the seriousness of the leprosy problem in Brazil. Up to the end of 1948 a total of 77,269 leprosy patients had been found. Of these, 11,184 were under control in dispensaries, and 21,918 were in residence in the 39 leprosaria throughout the country ; besides these there were 2,929 children of leprous parents in preventoria. The largest of the leprosaria, that at Pirapetingui, housed no fewer than 2,706 patients, and that at Santa Izabel 2,253.

This book is a compendium of most useful knowledge, arranged in an orderly and readable fashion. The illustrations make it particularly easy to understand, even by those who are not very competent Portuguese scholars, and all those taking an active part in anti-leprosy work are advised to possess a copy.

Ernest Muir

BAER, Jean G. **Ecology of Animal Parasites.** pp. x+224, 162 figs. 1951. Urbana : University of Illinois Press. [37*s.* 6*d.*]

This book embodies two courses in parasitology given by the author when visiting Professor in the Graduate College of the University of Illinois. Professor Baer's objective is to review the field of parasitology from all possible angles and to show that parasites are subject to the same general laws that govern all free-living organisms. It is obvious that with so wide a scope it would not be possible for the author to include detailed accounts of the morphology and life-cycles of the parasites, and the present volume is in no sense a guide to the recognition and classification of parasitic creatures. Professor Baer, however, makes it abundantly clear that the omission of information on the taxonomy of parasites in no way implies a lack of appreciation of the importance of this aspect of the subject ; indeed, he states : " It is the writer's contention that a taxonomic background is absolutely essential to a complete understanding of the relationship between the parasites and their hosts. This is the broad basis on which modern parasitology has been built up and to overlook it would be an unpardonable error."

The scope of the book is briefly as follows : Part One defines and explains the various terms used by the parasitologist. Part Two describes the various adaptations to a parasitic existence developed by different Classes of invertebrates. Part Three gives an account of host specificity and the action of invertebrate parasites on their hosts. Part Four deals with the physiology of

parasitic protozoa and parasitic helminths. In addition, it contains a review of the results of *in vitro* cultures of parasitic helminths and the conclusion is reached that : " From the above results it is clearly evident that, so far, no single, true culture of any parasitic helminth can be claimed. The field remains open and should yield important results as to the possible support from the physiological angle of host specificity." Part Five, which concludes the volume, contains a brief account of the origin of parasitism.

The book is finely printed on exceptionally good paper and is profusely and well illustrated by drawings made by Mrs. Katherine Hill Paul. There are extensive references at the end of each chapter, and the index—a very important part of a work of this type—is adequate.

As might be expected from an author of Professor Baer's standing there are few inaccuracies in the text, but the reviewer has noted one small slip which, since it has a direct bearing on the host-parasite relationship, should be corrected. On page 80, it is stated : " The eggs of *Cordylobia anthropophaga* (E.B1.), known as the Ver de Cayor, are deposited on the surface of the skin of a great number of mammals, including man ". Blacklock and Thompson [this *Bulletin*, 1924, v. 21, 150] showed that eggs of *C. anthropophaga* are laid on the ground, and these authors' observations have been confirmed by subsequent investigators.

This is an interesting, indeed a fascinating work which, for the reviewer at any rate, has achieved its aim of stimulating the reader's thoughts in new fields and encouraging him to consider old problems from new angles.

R. M. Gordon

Oldroyd, H. [M.A.] **The Horse-Flies (Diptera : Tabanidae) of the Ethiopian Region. Vol. I. Haematopota and Hippocentrum.** pp. ix+226, 15 maps & 318 figs. (150 on 26 pls.). 1952. London : British Museum (Natural History). [40*s*.]

This is the first of three volumes on the African horseflies (Family Tabanidae). It deals only with the genus *Haematopota* and the genus *Hippocentrum*. The remaining volumes, which the author hopes to complete in the next few years, will cover numerous other genera including *Tabanus* and *Chrysops*.

The book begins with a morphological description of the adult tabanid fly, and follows with the detailed descriptions of 171 valid species of *Haematopota* and 5 of *Hippocentrum*. Of these, 46 are new species. The descriptions, except for 7 species, were prepared afresh for this work ; 133 type specimens were examined as well as a large sample of specimens of a species wherever this was available. Keys to species are given and, in *Haematopota*, the species are considered in 11 species-groups. The specific descriptions of the females—males occur infrequently in collections or are quite unknown—are followed by details of distribution and the months of collection. There are 318 figures which include photographs of the wing-pattern and drawings of the frons and antenna of practically every species. The distribution of species is, in addition to text details, shown graphically in 15 maps. Short sections are devoted at the beginning of the book to the possible significance of interrupted feeding in diseases of man and animal, and to the biology of the little-known larvae and pupae.

This work fills a serious gap in the literature of blood-sucking flies of Africa and, with its companion volumes to follow, should do a great deal to forward the study of tabanids both from the biological point of view and in the problems allied to man and his domestic stock.

D. S. Bertram

BROWN, A. W. A. [M.B.E., B.Sc.F., M.A., Ph.D.] **Insect Control by Chemicals.** pp. vii+817, numerous figs. 1951. New York : John Wiley & Sons, Inc. & London : Chapman & Hall, Ltd. [100s.]

The book starts, rather suddenly one must admit, by pointing out the contrast between the early and middle part of the present century. Until about 1940 those who used insecticides put their reliance on a number of things such as mineral oils, arsenicals and (somewhat later) compounds containing fluorine : also substances derived from plants, *e.g.*, nicotine, rotenone and extracts derived from pyrethrum. Quite suddenly a new period broke with the introduction of the chlorinated hydrocarbons, first DDT, then BHC and later a number of still more recent substances produced in the U.S.A.

The author takes a very wide range of insecticidal substances, inorganic and organic, botanical in origin or synthetic, fumigant liquids and dusts. For each of them he discusses the physical and chemical qualities, particularly in relation to applied entomology.

The book then passes on to a discussion of the molecular structure of organic insecticides, related as far as may be to their insecticidal effects : for example molecular weights of members of certain chemical series are related to toxicity, also the insecticidal effect of the isomers of benzene hexachloride and of the analogues of DDT are studied. Even if rather few general principles emerge, one feels that a gallant attempt has been made to bring some order into the subject.

One then passes on to read two chapters written rather from the entomological point of view dealing with the structure of the insect's cuticle, the entrance of poisons into its body by many routes and generally the pharmacology of the subject.

In the 5th and 6th chapters we are given an account of types of equipment for distributing insecticides and in particular the use of aircraft for this purpose. This complicated subject is extremely well described, the author giving adequate attention to physical matters such as the size of droplets : also meteorological conditions : also the procedure that must be followed both by the pilot and by the ground staff if the spray is to reach the target and its effect be recorded and studied.

The medical reader will receive much value from two chapters discussing possible dangers to man and domestic animals from insecticides and the solvents in which they are frequently applied : also the chemical control of the insects that effect man and domestic animals. In the latter chapter a very large amount of information is set out insect by insect.

The book, as will be seen, covers a remarkable range but the author appears to have been able to deal with the whole subject comprehensively and thoroughly. Wherever we have been able to read his work critically, we have found it interesting, accurate and up-to-date. His book is, at least for the time being, the most useful work on the subject of insecticides. *P. A. Buxton*

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